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A Revision of the Nearctic *Medetera* (Diptera: Dolichopodidae)

Abstract

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In this revision of the Nearctic *Medetera* (Diptera: Dolichopodidae), all species are described and illustrated, and a key is provided for the North American species. Forty-six species are recognized in the fauna, 15 of which are new: *Medetera isobellae, M. potomac, M. platythrix, M. physothrix, M. utahensis, M. dorycondylus, M. vockerothi, M. subsignaticornis, M. flinflon, M. gaspensis, M. neomelancholia, M. saguaroicola, M. pseudosibirica, M. tuktoyaktuk,* and *M. canadensis.*

Thirty names are newly placed in synonymy: *M. nitidiventris* Van Duzee (= *M. petulca* Wheeler); *M. cuneiformis* Van Duzee (= *M. similis* Van Duzee); *M. obscuripennis* Van Duzee (= *M. xerophila* Wheeler); *M. longinquus* Van Duzee (= *M. falcata* Van Duzee); *M. univittatus* Van Duzee and *M. obsoletas* Negrobov and Thuneberg (= *M. aeneiventris* Van Duzee); *M. flavicosta* Van Duzee (= *M. aberrans* Wheeler); *M. viridifacies* Van Duzee, *M. trisetosus* Van Duzee, and *M. vanduzeei* Curran (= *M. signaticornis* Loew); *M. oregonensis* (= *M. aldrichii* Wheeler); *M. emarginatus* Van Duzee (= *M. vidua* Wheeler); *M. aurivittatus* Wheeler, *M. caerulescens* Malloch, *M. frontalis* Van Duzee, *M. parvus* Van Duzee, *M. ciliatus* Van Duzee, *M. venatus* Curran, *M. simplicipes* Curran, *M. orbiculata* Van Duzee, *M. albiciliata* Van Duzee, and *M. arctica* Van Duzee (= *M. apicalis* Zetterstedt); *M. idahoensis* Harmston and Knowlton (= *M. crassivenis* Curran); *M. princeps* Wheeler (= *M. diadema* Linnaeus); *M. tarasovae* Negrobov (= *M. halteralis* Van Duzee); *M. bilineata* Frey, *M. intermedia* Van Duzee, *M. albosetosa* Van Duzee, *M. wheeleri* Foote, Coulson, and Robinson, and *M. sphaeropyga* Negrobov (= *M. veles* Loew).

Lectotypes have been designated for *Medetera xerophila* Wheeler, *M. pinicola* Kowarz, *M. maura* Wheeler, *M. melancholia* Lundbeck, *M. aurivittatus* Wheeler, *M. cyanogaster* Wheeler, and *M. californiensis* Wheeler.

Seven species of *Medetera* have Holarctic distributions, including two probable Palearctic introductions to North America, and closely related species pairs exist between the Nearctic and Palearctic Regions.

A phylogenetic analysis of the Holarctic *Medetera* species groups is presented. The genera *Thrypticus* and *Dolichophorus* are seen as being derived from *Medetera.* The genus *Elongomedetera* Hollis and the subgenera *Asioligochaetus* Negrobov and *Lorea* Negrobov are regarded as synonyms of *Medetera.*

Medetera behavior and ecology are discussed. Rearing data, including tree and scolytid associates, are summarized for each species. The important scolytid-attacking *Medetera* species are not regarded as being specific on any scolytid host, and they have been reared from various tree species. A brachypterous form of *M. aequalis* is recorded from California beaches.

KEYWORDS: Bark beetles, brachyptery, Diptera, Dolichopodidae, Holarctic biogeography, introduced insects, leks, mating behavior, *Medetera,* Medeterinae, Nearctic *Medetera,* Palearctic *Medetera,* Scolytidae.

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By
Daniel J. Bickel

Acknowledgments

I thank the following institutions and their respective curators for the loan of specimens. For further reference to these institutions as repositories of types or other specimens, the following acronyms (after Heppner and Lamas, 1982) are used:

AMNH American Museum of Natural History, New York; P. Wygodzinsky
ANSP Academy of Natural Sciences, Philadelphia; D. Azuma
BMNH British Museum (Natural History), London; K. G. V. Smith
BPBM Bernice P. Bishop Museum, Honolulu; W. A. Steffan
CAS California Academy of Sciences, San Francisco; P. H. Arnaud, Jr.
CNC Canadian National Collection, Ottawa; J. R. Vockeroth
COSU Colorado State University, Fort Collins; H. Evans
CUIC Cornell University, Ithaca, N.Y.; L. L. Pechuman
FMNH Field Museum of Natural History, Chicago; E. H. Smith
FSCA Florida State Collection of Arthropods, Gainesville; H. V. Weems
FS-I U.S. Forest Service Intermountain Forest and Range Experiment Station, Ogden, Utah; G. D. Amman
FS-P U.S. Forest Service Pacific Northwest Forest and Range Experiment Station, Corvallis, Oreg.; T. Torgersen
FS-R U.S. Forest Service Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.; J. M. Schmid
FS-S U.S. Forest Service Southern Forest Experiment Station, Pineville, La.; J. C. Moser
INHS Illinois Natural History Survey, Champaign; D. W. Webb
IRSN Institut Royal des Sciences Naturelles, Brussels; P. Grootaert.
ISU Iowa State University, Ames; R. E. Lewis
KSU Kansas State University, Manhattan; H. D. Blocker
LACM Los Angeles County Museum, Los Angeles; C. L. Hogue
LUND Zoological Museum, Lund University, Sweden; R. Danielsson
MCZ Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; A. F. Newton
MEM Mississippi State University, Mississippi State; R. L. Brown
MFRC Maritimes Forest Research Centre, Fredericton, New Brunswick; F. A. Titus
MSUE Michigan State University, East Lansing; R. L. Fischer
MTSU Montana State University, Bozeman; S. Rose
NCSR North Carolina State University, Raleigh; C. Parron
NHMV Naturhistorisches Museum, Vienna; U. Aspöck
NYSM New York State Museum, Albany; T. L. McCabe
OSU Ohio State University, Columbus; C. A. Triplehorn
OSUC Oregon State University, Corvallis; M. D. Schwartz, J. Lattin
PADA Pennslyvania Department of Agriculture, Harrisburg; K. Valley
PUL Purdue University, Lafayette, Ind.; R. W. Meyer
SDSU South Dakota State University, Brookings; B. McDaniel
SMEK Snow Entomological Museum, University of Kansas, Lawrence; G. W. Byers
SUNY State University of New York, College of Environmental Sciences and Forestry, Syracuse; G. Lanier
TAMU Texas A & M University, College Station; S. J. Merritt
UAE University of Alberta, Edmonton; D. Shpeley, G. E. Ball
UAF University of Arkansas, Fayetteville; R. Chenowith
UAT University of Arizona, Tucson; F. G. Werner
UCB University of California, Berkeley; J. Powell
UCD University of California, Davis; R. O. Schuster
UGA University of Georgia, Athens; C. L. Smith
UMAA University of Michigan, Ann Arbor; B. M. O'Connor, T. E. Moore
UMAS University of Massachusetts, Amherst; T. M. Peters
UMO Hope Dept., University Museum, Oxford, U. K.; M. Scoble
UMSP University of Minnesota, St. Paul; P. J. Clausen
UNH University of New Hampshire, Durham; J. F. Burger
UNL University of Nebraska, Lincoln; B. C. Ratcliffe
USNM National Museum of Natural History, Smithsonian Institution, Washington, D.C.; F. C. Thompson
USUL Utah State University, Logan; W. J. Hanson
UWM University of Wisconsin, Madison; S. Krauth
WSU Washington State University, Pullman; W. J. Turner
ZIL Zoological Institute, Academy of Sciences, Leningrad, U.S.S.R.; V. Zaitsev, O. P. Negrobov
ZMH Zoologiska Museum, Helsinki, Finland; B. Lindeberg
ZMHB Zoologisches Museum, Humboldt Universitat, Berlin; H. Schumann
ZMUA Zoologisch Museum, Universiteit van Amsterdam, Netherlands; T. van Leeuwen
ZMUC Zoologisch Museum, Universitets Copenhagen, Denmark; L. Lyneborg, V. Michelsen

The following individuals kindly lent specimens from their personal collections: P. H. Arnaud, Jr., San Francisco, Calif.; M. Deyrup, Layfayette, Ind.; C. E. Dyte, Slough, England; F. C. Harmston, Salt Lake City, Utah; H. Robinson, Washington, D.C.; M. Whitmore, Seattle, Wash.; and N. E. Woodley, Cambridge, Mass. Information on *Medetera* was provided by N. Bedwell, State College, Miss.; J. Schmid, Fort Collins, Colo.; R. W. Meyer, Lafayette, Ind.; and O. P. Negrobov, Voronesh University, U.S.S.R. This research was supervised by W. L. Brown, Jr., Cornell University, Ithaca, N.Y. The habitus illustration of *Medetera bistriata* was provided by J. Powzyk, Museum of Comparative Zoology, Cambridge, Mass. The right wings of the *Medetera* species were drawn by Linda Lawrence, Systematic Entomology Laboratory, Insect Identification and Beneficial Insect Introduction Institute, Agricultural Research Service, U.S. Department of Agriculture.

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A Revision of the Nearctic *Medetera* (Diptera: Dolichopodidae)

by Daniel J. Bickel[1]

Medetera is a distinctive genus of more than 250 described species from all zoogeographic regions. The small, mostly gray adult flies are often numerous on tree trunks, walls, large rocks, and other surfaces. They adopt a characteristic vertical upright posture, with the long axis of the body leaning out from the surface. When disturbed, they run sideways or backward, or fly a short distance, always maintaining an upright position. Congregations of these small dolichopodids on vertical surfaces function to facilitate mating, although feeding on soft-bodied arthropods also occurs. A common name, "woodpecker flies," suggested by G. Shewell, Ottawa, aptly describes their characteristic stance on tree trunks. *Medetera* larvae and woodpeckers share another feature in common in that they are both important predators of scolytid bark beetles.

The association of *Medetera* with bark beetles has been of considerable interest to both North American and European forest entomologists. *Medetera* is often reared in great numbers from scolytid-infested logs, and the genus is considered important in controlling bark beetle populations. DeLeon (1935), for example, estimated that larvae of the western North American *M. aldrichii* may destroy up to 40 percent of *Dendroctonus ponderosae* broods within their galleries. *Medetera* females are known to oviposit at the entrance of galleries and apparently are attracted to infested trees by bark beetle aggregation pheromones.

Although *Medetera* is important as a biological control agent, the Nearctic fauna has not been well studied. Apart from a few prominent species, the identification of specimens using available keys has been virtually impossible. Past species descriptions have relied on nongenitalic characters, many of which are intraspecifically variable and neglect the rich array of distinctive characters provided by the male hypopygium. Prior to this revision, 53 names were considered valid for the Nearctic fauna (Foote et al., 1965; Robinson, 1967). This current work recognizes 46 species in the Nearctic fauna, 15 of which are new. Thirty names are newly placed in synonymy, including 3 Palearctic names. Seven species are recognized as having Holarctic distributions, including two probable Palearctic introductions to North America.

The Nearctic *Medetera* fauna is closely tied to that of the Palearctic, and several species and most species groups are Holarctic in distribution. This required my becoming familiar with the Palearctic fauna, with its more than 150 described species, many of uncertain identity. However, I was fortunate in being able to visit European collections, especially those in Leningrad and Helsinki, to study important types. Owing to a lack of specimens from northern Mexico, this revision essentially is confined to the continental United States and Canada. I have included the few Nearctic Mexican specimens seen and have noted any range extensions of Nearctic species into the Neotropics.

In this study, all species are defined on the basis of the male genitalia, which are illustrated for each species. Keys are provided based on male genitalia and, where possible, nongenitalic characters. Ecological data, especially tree and prey associations, are summarized from rearing records. Most importantly, the delimitation of natural species groups will provide a basis for the study of the world *Medetera* fauna.

[1]Entomologist, Department of Entomology, Australian Museum, Sydney, N.S.W. 2000 Australia. This bulletin is based on information contained in a thesis submitted to the Graduate School of Cornell University, Ithaca, N.Y., in partial fulfillment of the requirements for the degree of doctor of philosophy.

Materials and Methods

This study is based on over 10,000 specimens of *Medetera* borrowed from 64 institutions and individuals (see Acknowledgments for listings and acronyms). I examined the type specimens of all Nearctic *Medetera* except *M. bistriata, M. diadema, M. truncorum,* and *M. albiciliata*. If type material of exotic *Medetera* was examined, an asterisk (*) follows the name. After each formal citation, the acronym of the institution housing the primary types is given. I have listed only the synonyms directly involving Nearctic species. For synonymies of older Palearctic names involving Holarctic species, consult Negrobov (1971-77).

Specimens initially were sorted according to superficial similarity. The male terminalia were prepared from representatives of each associated series to determine groupings of specimens deemed conspecific. The male genitalia of each species were drawn as the study proceeded. Isolated females of species lacking diagnostic characters were left unidentified, but usually they were assigned to a species group.

Since *Medetera* males have large external hypopygia, removing the genital capsule from relaxed specimens is relatively easy. Often the hypopygium can be cleanly teased away from the eighth sternum, or the postabdomen can be clipped off at the sixth segment. Genitalia are cleared either in cold 10 percent potassium hydroxide (KOH) overnight or in KOH heated in a hot water bath for several minutes. After the hypopygium is washed in acidified water, it is transferred to 70 percent ethanol. Owing to the small size and need for stable positioning of the genitalia, I have found glycerin gel more practical than ordinary glycerin as a temporary mounting medium. After a slide is warmed to melt a small amount of glycerin gel, the hypopygium is transferred to the liquid and positioned as the gel cools. Thus the structure can be maintained and studied at any position without the shifting that occurs in liquid glycerin. The gel can be reheated and the specimen repositioned repeatedly. Also, glycerin gel slides are readily stored at any angle for future reference. After study, a small block of glycerin gel containing the genitalia is cut from the slide and transferred to a microvial to be pinned through the stopper with the specimen. Also, glycerin gel is superior to liquid glycerin, since the hypopygium is protected from damage within the gel block, is readily retrievable, and thus are avoided the frustration and potential damage caused in trying to free a delicate structure from a drop of glycerin lining the bottom of a microvial.

Drawings of genitalia were made with a camera lucida attached to a compound microscope. The left lateral view is illustrated for all species, supplemented by ventral views of the hypandrium, aedeagus, or entire hypopygium. It must be emphasized that in the lateral view the top of the page shows morphologically the ventral side and the bottom the dorsal. Since the cerci are normally held between the gonopods at rest, I have drawn them in a deflexed position so that distinctive apical structures are visible.

Descriptions are as brief as possible. Features common to a species group are listed in the introductory discussion and not repeated unless for clarification. The diagnostic characters of each species are given in the key and as part of the species description. Measurements were made on dried, mounted material using an ocular grid and are given in millimeters. The measurements were made on representative specimens and should not be considered as invariable for a species. Although the podomere lengths are actual measurements, they should be regarded more as representative ratios. Body length in males is from the base of the antennae to the tip of the seventh abdominal segment. Female body length is generally similar to that of the male of its species unless otherwise noted. Wing length is the perpendicular distance to the apex from an imaginary extension of the humeral crossvein; wing width is measured from the junction of R_1 with the costa to the opposite side of the wing, perpendicular to the wing's long axis. The "wing ratio" is the length of the m-cu crossvein to the distal section of CuA. Wings of representative species are figured. Podomere measurements for each leg are given in the formula: Trochanter-femur; tibia; tarsomere 1/2/3/4/5.

The following abbreviations are used:

I, II, III—prothoracic, mesothoracic, metathoracic
1, 2, 3, 4, 5, 6, 7, 8, 9, 10—abdominal segments 1-10
S—abdominal sternum
T—abdominal tergum
ac—acrostichal bristles
dc—dorsocentral bristles
hm—postpronotal bristles
np—notopleural bristles
pa—postalar bristles
pm—presutural supraalar bristles
ppls—proepisternal bristles
sa—postsutural supraalar bristles
sr—presutural intraalar bristles

The morphological terminology follows McAlpine (1981).

Except for new or rare species, label data are not recorded. Instead, the distribution is summarized and the collection localities are plotted on distribution maps. On these maps, unless females are distinctive

and can be recognized without associated males, all data points represent males. It must be remembered that large areas of the North American continent have not been well collected, and many species are more widely distributed than indicated on the maps. Palearctic distribution summaries are taken from Negrobov (1971–77).

Collection dates are also summarized, and Roman numerals are used to indicate months. Most species have a fairly long flight period during the warm months, but in wide-ranging species, collection dates are summarized for various regions. Any biological data along with rearing records are summarized. Unless otherwise noted, all rearing records are from specimen labels. Hopkins' numbers refer to a file of forestry rearing data housed at the U.S. Department of Agriculture, Washington, D.C.

Medetera species are readily collected from such vertical surfaces as trees and walls by placing a killing tube over resting individuals. The specimens usually fly outward into the tube, after which the top is quickly replaced. Some species rarely found on vertical surfaces are often taken in Malaise traps. Specimens are mounted by the conventional methods of pointing or gluing to the sides of pins. In freshly mounted males, the hypopygium is teased away from the abdomen, so that it is hanging down or outward and can be easily examined or removed during later study.

Historical Summary

The genus *Medetera* was erected in 1819 by Fischer von Waldheim to include a new species, *Medetera carnivora,* which has since been considered a synonym of the Linnaean *Musca diadema*. Fischer von Waldheim used the name in the feminine, *Medetera,* although many authors, starting with Meigen (1824), have incorrectly used the masculine form, *Medeterus*. Fallén (1823) placed the Fabrician species *Musca rostrata* in *Hydrophorus,* and some early workers, such as Macquart and Zetterstedt, described species of *Medetera* in that genus. Loew (1857, 1861) described several *Medetera* species, and he (1864) clearly defined the genus.

The first important Palearctic treatment of *Medetera* was that of Kowarz (1877), a work rather modern in several respects. Kowarz recognized the importance of illustrating male genitalia, and he discussed the problem of intraspecific variation. Unfortunately, most later authors failed to follow his example. Becker (1917–18), in his study of the Palearctic Dolichopodidae, reviewed the genus, as did Parent (1927). Lundbeck (1912) treated the Danish fauna, Parent the Egyptian (1925) and French (1938) faunas, and Collin (1941) the British fauna. Thuneberg (1955) revised the Palearctic *Medetera* with special emphasis on the Finnish fauna and included genitalic illustrations of all species. After describing a number of new species from the Soviet Union (1966, 1967), Negrobov undertook a full-scale revision of the Palearctic fauna, which appears in "Die Fliegen der palaearktischen Region" (1971–77). This work nearly doubled the number of species in the Palearctic fauna, which with a few additional descriptions now stands at 161 species. Krivosheina (1974) studied the larval morphology of 16 Palearctic *Medetera* species and provided keys based on the denticles of the pseudopods.

Loew (1861) described the first two Nearctic *Medetera, M. veles* and *M. nigripes*. Wheeler (1899) added 11 new species. Van Duzee (1914, 1919, 1923, 1924, 1925, 1928a, 1928b, 1932, 1933a, 1933b) described the bulk of the Nearctic fauna, with additional descriptions by Malloch (1919), Curran (1928), Parent (1929), Harmston and Knowlton (1941, 1943), Harmston (1951), and Robinson (1967). Arnaud (1963) and Steyskal (1967) have added nomenclatorial notes.

For summaries of the non-Holarctic faunas, see Robinson (1970b, 1975) for the Neotropical Region, Dyte and Smith (1980) and Negrobov et al. (1981) for the Afrotropical Region, Dyte (1975) for the Oriental Region, and Parent (1932) and Hardy (1939) for the Australian Region.

Genus *Medetera* Fischer von Waldheim

Medetera Fischer von Waldheim, 1819:7 (as genus). Type-species, *Medetera carnivora* Fischer von Waldheim, 1819 (monotypy) [= *Musca diadema* Linnaeus]
Oligochaetus Mik, 1878:7 (as genus). Type-species, *Medeterus plumbellus* Meigen, 1824 (orig. designation)
Saccopheronta Becker, 1914:25 (as genus). Type-species, *Saccopheronta nudipes* Becker, 1914 (monotypy)
Elongomedetera Hollis, 1964:260 (as genus). Type-species, *Elongomedetera thoracica* Hollis, 1964 (orig. designation), SYN. NOV.
Asioligochaetus Negrobov, 1966:877 (as subgenus). Type-species, *Oligochaetus vlasovi* Stackelberg, 1937 (orig. designation), SYN. NOV.
Lorea Negrobov, 1966:878 (as subgenus). Type-species, *Medetera spiniger* Stackelberg, 1937 (orig. designation), SYN. NOV.

This section treats the general morphology of adult *Medetera*. This revision does not directly consider immature stages. For further information on larval and pupal morphology, see DeLeon (1935), Krivosheina (1974), and keys in Robinson and Vockeroth (1981).

Diagnosis

Medetera is a genus of relatively small dolichopodids, 1.2 to 4.4 mm in length, usually dark metallic green to black, the coloration often obscured by a waxy gray or brown pruinosity, although sometimes bright metallic green, little obscured by pruinosity. The genus has a distinctive habitus, which with little practice is easily recognized, even by the unaided eye. In addition to its characteristic stance in life, the combination of the heavily sclerotized proboscis, strongly flattened mesoscutum, and the distinctive arch of both R_{4+5} and M enables one to spot the genus at a glance.

Description

Head: Postcranium strongly concave dorsally; vertex somewhat excavated, ocelli on small tubercle; single pairs of verticals, short postverticals, and ocellar bristles present; frons and face wide, broader in females than males; frontoclypeal suture distinct, usually marked by band of pruinosity; clypeus often metallic and shining, either smooth or with fine coriaceous sculpture; antennae adjacent, covered with fine pubescence; scape and pedicel usually short, although scape sometimes elongate in *signaticornis-pinicola* group; scape and pedicel sometimes yellow; pedicel with incomplete ring of apical setae in *aberrans* group; 1st flagellomere subrectangular to subtriangular, arista borne apically in slight notch; arista bare or finely pubescent; eyes large, oval, widely separated in both sexes; eyes bare, without short setulae characteristic of most dolichopodid genera; in life, eyes usually dark green, appearing dark red in dried specimens; palpi usually dark brown, with strong apical seta and short hairs; proboscis in most *Medetera* species large and massive, labella heavily sclerotized and somewhat bulging laterally; fine hairs present along ventral margin of proboscis; labella with 6 pseudotracheae, not geminately sclerotized (see Cregan (1941) for further details); postorbitals usually short and dark dorsad, becoming long and pale ventrad; ventral postcranium usually with scattered pale setae.

Thorax: Rectangular in dorsal view; posterior half of mesoscutum distinctly flattened, even slightly concave; mesonotal suture distinct only laterally, becoming obscure mesad; thorax in lateral view appears arched anteriorly; thorax often covered by heavy pruinosity, sometimes with 3 unicolorous stripes or vittae, present between acrostichals and over dorsocentrals, extending laterally toward postpronotum and fading out along border of mesoscutal depression; acrostichals (ac) in 2 rows, usually increasing in length caudad and ending before mesoscutal depression, sometimes reduced or absent; dorsocentral bristles (dc) strong posteriorly bordering depression, decreasing somewhat cephalad, either with abrupt size difference between short anterior setulae (fig. 6), or more gradual decrease, merging into setulae (fig. 4); field of short setulae extends laterally from anterior dc area toward postpronotum (humeral callus); 1 postalar (pa); 2 (sometimes 1) postsutural supraalars (sa), anterior sa always shorter than posterior; 1 presutural interalar (sr); 1 presutural supraalar (pm); 2 (sometimes 1) notopleurals (np); 1 postpronotal (hm), sometimes with extra strong seta developed ventrally along notopleural suture; 2-6 proepisternal bristles (ppls); mesoscutellum with pairs of median and lateral scutellar bristles, although laterals are reduced to weak hairs or totally lost in some species. (See figure 2 for position of thoracic setae.)

Legs: Coxae I and II with short setulae anteriorly; coxae II and III each with single strong lateral seta; legs elongate, bristles usually poorly developed; tibia III always longer than femur III, and in members of *diadema-veles* group, tibia II is longer than femur II; sometimes long pale setae present along ventral surface of femora; strong dorsoapical setae sometimes present on male tibia III; members of *aberrans* group often with some strong anterior setae on femora II and III; males of *petulca* with strong anteroapical spur on tibia III (fig. 7); males of *diadema-veles* group with basal anteroventral tooth on basitarsus III (fig. 8); claws paired, subtended by 2 small pulvilli.

Wings (fig. 9): Usually hyaline, but some females of *petulca* group with brownish clouding basad; males of some species with basal sector of CuA variously thickened (*crassivenis* group, some *petulca* and *apicalis* groups); m-cu crossvein usually located beyond middle of wing, not far from junction of CuA with posterior wing margin; "bosse alaire" of Parent (1938), a flection in distal sector of M, present in many dolichopodids, absent in *Medetera;* basal sector of M curves down to m-cu, then arching up toward R_{4+5} to apex; curvature of M combined with anterior arching of R_{4+5} gives *Medetera* its distinctive venation; anal vein A_1 and cell cup (anal cell) usually present, but sometimes indistinct; lower calypter bearing long marginal setae.

Abdomen: Cylindrical, covered with short setulae; terga 2-5 with ovoid depressions laterally; female sterna normal, forming collarlike bands without posterior excavations; male sterna modified to receive hypopygium, which at rest is tucked up against and slightly enfolded by abdomen with tips of surstyli held under hindcoxae; sterna 6 and 7 reduced to narrow bands; sterna 2-5 often with posterior midventral excavations.

Male Postabdomen: Tergum and sternum 7 rotated to left lateral position and forming elongate trapezoidal or triangular hypopygial peduncle; sternum 8 forming cap over hypopygial foramen on left side of hypandrium (figs. 38, 123).

Numerous systems of nomenclature have been used in describing hypopygial structures. In table 1, the equivalent terminology of various authors is given. I have followed McAlpine's (1981) system, which should help standardize usage. Negrobov (1966, 1967) initially used a terminology similar to the one followed in this revision. Later, however, in Negrobov and Stackelberg (1971) and Negrobov (1971-77), the nomenclature was altered somewhat, so that what had been regarded as surstyli became the gonopods, and the bristles of the surstyli became the surstyli, sensu stricto. However, the structures Negrobov later called "gonopods," situated distally on the epandrium (tergite 9), cannot be the gonopods as defined by McAlpine, a pair of primitively two-segmented arms arising posterolaterally on the hypandrium (sternite 9). These "gonopods" are clearly associated with the epandrium and do not arise near the hypandrium. These projecting arms are more correctly regarded as surstyli (possibly homologous with tergite 10), are closely associated with the epandrium (tergite 9), and tend to form a pair of lateral lobes. Thus Negrobov's earlier usage of "surstyli" is correct and is followed here. Ulrich (1974, 1977) follows a terminology in accord with Griffiths' (1972) periandrial theory.

Table 1.—Hypopygial terminology of various authors

Present work	Negrobov (1966, 1967)	Negrobov and Stackelberg (1971) and Negrobov (1971-77)	Ulrich (1974, 1977)
Hypandrium	Hypandrium	Hypandrium	Opishypandrium.
Cercus	Cercus	Hypandrium	Cercus.
Surstylus	Surstylus	Gonopod	Telomere.
Epandrial lobes.	Paired bristles at base of surstyli.	Surstyli	Bristles of reduced ventral process of basimere.
Epandrium	Epandrium	Epandrium	Periandrium + prohypandrium.

Hypopygium (fig. 10): Epandrium (tergite 9) forming elongated, somewhat flattened, cylindrical capsule, bearing large left lateral "hypopygial foramen"; single strong "epandrial seta" usually present on ventral margin of epandrium between epandrial lobes and base of hypandrium; paired "epandrial lobes" present near base of surstyli; these lobes usually adjacent, positioned lateral to each other, sometimes fused or otherwise modified, and usually each bears a strong apical bristle; hypandrium (sternite 9) forming elongate cover over aedeagus and ventral cavity of epandrium; hypandrium with basal membranous connection or hinge to epandrium; aedeagus usually elongate, arising within epandrium, and with internal, basal, ejaculatory "bulb"; aedeagus often flanked laterally by short "winglike" appendages; in some *Medetera* species, pair of elongate "bottle-brush" processes arise internally from ascending part of aedeagus; these probably have a sensory function (Negrobov (1971) referred to these structures as "parameres," although they appear to have arisen de novo, making their homology uncertain); surstyli usually fused basad, and with dorsal and ventral arms that may be further subdivided, bearing various setae, modified projections, etc.; surstyli fused to distal part of epandrium, although line of weakness along juncture is often evident in cleared specimens, and some species have slight membranous band separating surstyli from epandrium; cerci (segment 11) paired, often with distinctive apical unguiform setae and cuticular processes; in life, appendages of hypopygium may be expanded with hypandrium raised, cerci rotated downward, and surstyli moved laterally.

Female Terminalia: Abdomen telescoped, with 5 visible collarlike segments concealing 4 retracted segments of oviscapt; terga 9 and 10 fused, usually bearing pair of apical projections (figs. 12, 13), which are probably remnants of spine bearing "hemitergites" or "acanthophorites" found in other dolichopodids and lower Brachycera; pair of cerci arise ventrally beneath terga 9 + 10.

Remarks

Medetera is the principal genus of the subfamily Medeterinae. Several taxa, regarded as synonyms of *Medetera,* are considered here.

The genus *Oligochaetus* was erected by Mik (1878) to accommodate those *Medetera* species with ac missing, only two strong median scutellars, and laterals either reduced to weak side hairs or totally lost. Authors have variously combined *Oligochaetus* with *Medetera* (Lundbeck, 1912; Becker, 1922b; Collin, 1941), regarded it as a subgenus of *Medetera* (Becker, 1917; Thuneberg, 1955; Negrobov, 1966) or as a genus of equal ranking with *Medetera* (Parent, 1925, 1927, 1938). Negrobov (1966) reviewed *Oligochaetus* and regarded it as a subgenus, but later he (1971) combined it with *Medetera.* As previously treated, *Oligochaetus* was a polyphyletic grouping, since the reduction-loss of the lateral scutellars occurred independently at least twice in *Medetera,* in the *petulca* group, and in a Palearctic assemblage of the *diadema-veles* group.

Becker (1914) distinguished the genus *Saccopheronta* on the loss of A_1 and cell cup, but later he (1923) regarded it only as a subgenus of *Medetera.* Curran (1927) and Parent (1935) treated this Afrotropical group as a genus, as have Negrobov et al. (1981) in a revision of the group. I have examined the paratypes of *S. caffra* (AMNH). Although the anal vein and cell cup are not as well developed in this species as in other *Medetera* species, they are faintly present. Other characters, especially the structure of the surstyli, epandrial lobes, and cerci, place *Saccopheronta* well within *Medetera,* near the *petulca* group.

Hollis (1964) described the monotypic genus *Elongomedetera* from Indonesia. He distinguished this genus from *Medetera* s.s. by its elongate thorax, relatively long legs, and lack of strong anal lobe. I have examined the male holotype of *E. thoracica* (ZMUA) and find its hypopygial structure is characteristic of *Medetera.* In body morphology, this species is somewhat derived, but I consider separate generic status is unwarranted.

Negrobov (1966) erected the subgenus *Asioligochaetus* to accommodate a Central Asian species with female brown wing clouding, three pairs of dc, and only median scutellars present. In the subgenus *Lorea* (Negrobov, 1966), the males have a thickened basal CuA. In both instances, these subgenera are best considered members of the Holarctic *petulca* group assemblages (see introduction to the *petulca* group for further discussion).

Instead of maintaining formal subgenera, I believe that recognizing only species groups seems best and thus allows for greater flexibility in associating species.

Systematic Position of *Medetera*

The subfamily Medeterinae was first defined by Lundbeck (1912), with additional comments by Becker (1917, 1922a, 1922b). (See Negrobov (1971) for historical consideration of the subfamily.) More recently Robinson (1970a) and Ulrich (1981) have reviewed subfamily concepts within the Dolichopodidae.

The Medeterinae is defined by the following complex of characters: Arista apical; distinct frontoclypeal suture; dorsally concave postcranium (apomorphy); short postverticals; posterior slope of mesoscutum distinctly flattened (apomorphy); ac in 2 rows; legs usually without strong bristles, femora without anterior preapicals (apomorphy); M without flection or "bosse alaire" in distal sector (apomorphy); R_{4+5} usually arched anteriorly; hypopygium large, on peduncle formed by tergum 7; epandrium usually elongate, somewhat flattened, and cylindrical; "epandrial seta" present ventrally between base of hypandrium and epandrial lobes; pair of bristle-bearing "epandrial lobes" present along ventral margin of epandrium; hypandrium elongate, with membranous attachment to epandrium; surstyli joined basally into elongate arm and usually fused to epandrium; cerci often with apical processes and modified setae; female terga 9 + 10 at most with only 1 pair of apical projections (= dornen, acanthophorites).

Medetera is the principal genus of the Medeterinae. Two genera, the cosmopolitan *Thrypticus* and the Palearctic *Dolichophorus,* undoubtedly are derived from *Medetera* (see Phylogenetic Analysis). Additional genera that have been placed in the Medeterinae include *Cryptopygiella, Cyrturella, Dominicomyia, Microcytura, Micromedetera,* and *Microchrysotus.* Although *Dominicomyia, Microchrysotus, Microcytura,* and *Cryptopygiella* display certain medeterine features (see Robinson (1964b, 1967)), their placement in the subfamily is uncertain, since their hypopygia are not large and pedunculate, but are small and cap the tip of the abdomen. I place the following genera in the subfamily Medeterinae:

Cyrturella Collin; Palearctic and Oriental
Dolichophorus Lichtwardt; Palearctic
Medetera Fischer von Waldheim; Cosmopolitan
Micromedetera Robinson; Neotropical
Thrypticus Gerstacker; Cosmopolitan

Of uncertain placement in the Medeterinae:

Cryptopygiella Robinson; Neotropical
Dominicomyia Robinson; Neotropical
Microchrysotus Robinson; Neotropical
Microcytura Robinson; Neotropical

Medetera and *Thrypticus* may be identified in the key by Vockeroth and Robinson (1981), a key that distinguishes these genera in the context of the entire Nearctic dolichopodid fauna.

Phylogenetic Analysis

Recently, numerous works have been published concerning the principles and methods of phylogenetic analysis, centered around the methods of Hennig (see Wiley (1981) for an overview).

In summary, a phylogenetic, or cladistic, classification is based on the recognition of taxa sharing one or more uniquely derived characters, or synapomorphies. Such taxa are considered to be monophyletic, or sharing a unique history of descent. Two taxa sharing synapomorphies are called sister groups. Shared ancestral characters, or plesiomorphies, cannot be used to define a natural evolutionary group.

A vast array of potential characters confront the student of any taxon. To undertake a phylogenetic analysis, the systematist must determine the polarity of characters, reflecting probable plesiomorphic and apomorphic conditions. Several approaches are useful. "Outgroup" analysis, the comparison with related taxa, is valuable in defining synapomorphies of the taxon under consideration. The presence of unique and de novo structures is a strong indication of apomorphy. The seemingly contradictory trends of progressive reduction and loss of structures and the elaboration of new structures are useful in determining character polarities and evolutionary trends. However, these approaches must be used with care, since there are several major problems.

Some characters may be so highly variable that polarity cannot be reliably determined. Also, within any given taxon, there may be a tendency for a particular character to be developed independently in different lineages (homoplasy). In *Medetera,* for example, a thickened basal CuA in the wings of males has developed independently at least three times and is regarded as homoplastic because of nonconcordance with other characters. Such a character is useful where it occurs, but it cannot be used alone as evidence of common ancestry.

Character reversals are not uncommon, or, considered in another way, an apomorphy may not always be expressed in all members of a monophyletic lineage (Gauld and Mound, 1982). Another problem is that some lineages are clearly defined by a group of strong apomorphies, whereas the true sister group may lie within some residual group that is imperfectly characterized.

Nevertheless, the great strength of phylogenetic analysis lies in clearly stating the characters used and their assumed polarity. Thus the work stands to be corroborated or refuted.

The principal characters used in the phylogenetic analysis of the Holarctic *Medetera* species groups include structures of the male hypopygium, male and female secondary sexual structures, the ovipositor, and a few nongenitalic characters. In this analysis, I have used the subfamily Neurigoninae as an outgroup for comparison with the Medeterinae. The Medeterinae and Neurigoninae share several apomorphic character states, such as 2, 6, 7, and 18 in the following list, and they probably have a sister-group relationship. I have examined representatives of the genus *Neurigona* to determine the character states of the Neurigoninae. Only the Holarctic *Medetera* species groups and the medeterine genera *Thrypticus* and *Dolichophorus* are included in this analysis. Extralimital species groups and the remaining medeterine genera *Micromedetera* and *Cyrturella* await further study. Some comparison is also made with the dolichopodid subfamily Sympycninae, which shares some similarities with the probable dolichopodid sister group, the empidid subfamily Microphorinae (Colless, 1963). The ancestral and derived character states and discussion follow.

	Character	*Plesiomorphic state*	*Apomorphic state*
(1)	Vestiture of eyes	Short hairs present.	Eyes bare.
(2)	Postcranium	Convex dorsally	Concave dorsally.
(3)	Proboscis	Weakly sclerotized	Massive, heavily sclerotized.
(4)	Acrostichals	Present	Reduced in size or lost.
(5)	Lateral scutellars	Prominent	Reduced to hairs or lost.
(6)	Mesoscutal slope	Convex	Flattened.
(7)	Preapical femorals.	Present	Absent.
(8)	Coxa I	Bare	With anterolateral bristle.
(9)	Coxa III bristle	Single lateral	2 laterals.
(10)	Male foretarsi	Unmodified	Lobate tarsomeres.
(11)	Male tibia III	do	With anteroapical spur.
(12)	Male basitarsus III	do	With anteroventral tooth basally.
(13)	Distal veins M, R_{4+5}.	Subparallel (?)	Arched anteriorly.
(13a)	Do	Arched anteriorly	Subparallel.
(14)	Vein A_1	Present	Reduced or lost.
(15)	"Bosse alaire"	do	Lost.
(16)	Male basal CuA	Unmodified	Thickened.
(17)	Female wings	Hyaline	With brown clouding.
(18)	Hypopygium	Small, caplike	Large, pedunculate.
(19)	Epandrium laterally.	Subrectangular	Pyriform.

(20)	Epandrial seta	Present	Reduced or lost.
(21)	Epandrial lobe bases.	Short, collarlike	Long, cylindrical.
(22)	Epandrial lobes	Separate	Fused.
(23)	Do	Similar size, shape	Basomedial lobe modified.
(24)	Hypandrium	Broad, rectangular	Narrow, tapering.
(25)	Hypandrium ventrally.	Symmetrical	Asymmetrical.
(26)	Hypandrium	Flat over aedeagus	"Clasping" aedeagus.
(27)	Aedeagus	Parallel sided	Tridentate.
(28)	Aedeagal gonopore.	Apical	Subapical.
(29)	Bottle-brush appendage.	Absent	Present.
(30)	Juncture of surstyli with epandrium.	Membranous "hinge."	Fused.
(31)	Apical surstylar lobes.	Present	Fused together.
(32)	Length of ventral and dorsal surstylar lobes.	Subequal	Dorsal lobe longer.
(33)	Frayed seta ventrally on surstylus.	Absent	Present.
(34)	Deep cercal furrow.	---do	Do.
(35)	Cerci apically	Blunt	Elongate, tapering.
(36)	Female ovipositor apical projections.	Present	Absent.
(37)	Female ovipositor	Membranous	Sclerotized, lanceolate.
(38)	Larvae	Subcortical predators.	Grass stem miners.
(39)	Position of arista	Dorsal	Apical.
(40)	Hypopygium	Various	Globular.

(1) Eyes bare considered an apomorphy for some Medeterinae; the Neurigoninae have short hairs between the facets.

(2) Postcranium concave dorsally considered an apomorphy for the Neurigoninae and Medeterinae; in the Sympycninae and most other dolichopodids, the postcranium is convex.

(3) Proboscis weakly sclerotized is the condition in the Neurigoninae and some *Medetera* species; the massive, heavily sclerotized proboscis found in some *Medetera* species is considered an apomorphy.

(4) Acrostichal bristles (ac) are primitively present; reduction or loss is considered apomorphic.

(5) Scutellar bristles: Ancestral condition with two pairs of equal strength, the medians and laterals; in the derived condition, the laterals are reduced to weak hairs or lost.

(6) Posterior slope of mesoscutum flattened or depressed is considered a derived condition. Ulrich (1971) questioned whether the flattening of the mesoscutum is an ancestral or derived character in the Empididae and Dolichopodidae. In specimens of pharate *Medetera aldrichii,* preserved just upon emergence from the pupal cuticle, the mesoscutum is distinctly rounded, not depressed as is characteristic of all Medeterinae and Neurigoninae species. The depression of the mesoscutum undoubtedly occurs shortly after eclosion, perhaps upon flection of the wings. This provides strong ontogenetic evidence that a mesoscutal depression is a derived character, not only in the *Medetera,* but wherever it occurs in both the Dolichopodidae and Empididae. Such mesoscutal flattening has occurred independently several times, and I suspect it has a mechanical function related to the attachment of the longitudinal flight muscles or the elasticity of the thorax. There is a certain similarity in flight between *Medetera* and *Neurigona,* both found on vertical surfaces and both with the depression.

(7) Loss of preapical femoral bristles considered a derived condition; the primitive Sympycninae have distinct anterior preapicals on femora II and III.

(8) Coxa I with long anterolateral bristle in both sexes, considered a derived condition, is found in *Dolichophorus.*

(9) Coxa III with one lateral bristle is considered ancestral, and is found in both the Medeterinae and Neurigoninae; the derived condition in *Thrypticus* has the coxa with two lateral bristles.

(10) Male tarsus I unmodified ancestrally; a derived condition with lobate tarsomeres 2 and 3 occurs in most *aberrans* group species.

(11) Male tibia III unmodified ancestrally; derived state with stout anteroapical spur, as in the *petulca* group.

(12) Male basitarsus III unmodified ancestrally; derived state with anteroventral tooth basally in *diadema-veles* group.

(13) Distal sector of M and the entire R_{4+5} bowed anteriorly, and veins R_{2+3} and M equidistant at the level of the m-cu crossvein and at the vein apices, provide the distinctive venation of *Medetera,* considered derived for the genus.

(13a) In *Thrypticus,* M and R_{4+5} are subparallel, and veins R_{2+3} and M are divergent beyond the level of crossvein m-cu; this venation is considered derived from the *Medetera* type venation (13), and not plesiomorphic, owing to the nonconcordance of other characters.

(14) Wing vein A_1 is present in most dolichopodids, including *Medetera,* and is considered ancestral; its reduction and loss, with the corresponding loss of the cell cup, are considered a derived state in *Thrypticus* and some *Medetera* ("*Saccopheronta*").

(15) The "bosse alaire" of Parent (1938), the convex circular flection in the middle of distal M_{1+2}, is present on the wings of the Neurigoninae and Sympycninae; its loss is considered a derived condition and is so for the Medeterinae.

(16) CuA of male wing: Ancestrally of equal thickness for its entire length; in a derived condition, the basal sector of CuA is thickened in males only, and this has occurred independently three times in *Medetera:* In the *petulca* subgroup (= *Lorea*), where the entire basal CuA is thickened; in the *crassivenis* group with a sausage-shaped thickening; and in a Palearctic member of the *apicalis* group, with a slightly expanded vein.

(17) Female wings hyaline in ancestral state; some members of the *petulca* group have a brownish clouding basally centered around R_{2+3} and R_{4+5}; I know of no other dolichopodid group where such clouding occurs only in females, and I consider it derived.

(18) Hypopygium encapsulated at the tip of the abdomen is considered plesiomorphic in the Dolichopodidae, and it is the condition in the Sympycninae; hypopygium pedunculate and flexible is derived, probably several times independently in the Dolichopodidae; both the Neurigoninae and Medeterinae have large pedunculate hypopygia; the placement of genera such as *Microcyrtura, Dominicomyia, Cryptopygiella,* and *Microchrysotus* in the Medeterinae is somewhat uncertain, since they all have small, encapsulated hypopygia.

(19) Epandrium in lateral view appears roughly subrectangular in most *Medetera* and is regarded as ancestral. The *diadema-veles* group has a basally inflated "pyriform" epandrium, regarded as derived.

(20) Epandrial seta present, well developed in most *Medetera,* and is considered ancestral; the epandrial seta is greatly reduced or totally lost in the *diadema-veles* group, and it is considered a derived condition.

(21) Epandrial lobes with short collarlike bases considered ancestral; with elongate, cylindrical bases considered derived.

(22) Epandrial lobes separated, each bearing a strong bristle ancestrally; the derived state is partial to complete fusion of the lobes into an elongate collar bearing both bristles. This state is derived in the *diadema-veles* group and in *Dolichophorus* and *Thrypticus.*

(23) Epandrial lobes primitively of similar size and shape; the basomedian lobe is variously modified in some members of the *petulca* group.

(24) Hypandrium broad and subrectangular ancestrally; narrow, tapering, and lanceolate in a derived state.

(25) Hypandrium symmetrical in ventral view is ancestral; asymmetrical, sometimes bizarrely modified in members of the *pinicola* subgroup.

(26) Hypandrium lying flat on the aedeagus is considered ancestral in *Medetera;* in the *apicalis* group, the hypandrium appears to basally enclose or "clasp" the aedeagus as it emerges from the epandrium.

(27) Aedeagus parallel sided considered ancestral in *Medetera*; a tridentate aedeagus is considered derived.

(28) Aedeagus more or less tubular, and with an apical gonopore considered ancestral; aedeagus with gonopore subtending an expanded dorsoapical outgrowth as in the *nova* group (fig. 18) is considered derived.

(29) An elongate "bottle-brush"-shaped appendage arises internally from the aedeagus in the *pinicola* subgroup and is considered a de novo apomorphy.

(30) Surstyli ancestrally free from epandrium, with a distinct membranous "hinge-line" found in the Neurigoninae and some *Medetera;* in a more derived condition, the surstyli become fused to the epandrium, with only a faint indication of the juncture.

(31) Surstyli with distinct dorsal and ventral lobes present, at least apically; totally fused into a single lobe with median processes in the *isobellae* group.

(32) Surstyli with dorsal and ventral lobes subequal in length in most species; in the *aberrans* group, *Dolichophorus,* and *Thrypticus,* the dorsal lobe is greatly prolonged and expanded distally, with the ventral surstylus reduced to a small, subtending lobe.

(33) A distinctive, flattened, curved, distally frayed seta on the subapical ventral surface of the surstyli (e.g., fig. 90) considered a de novo structure, and a synapomorphy uniting the *apicalis* and *crassivenis* groups.

(34) Cerci not differentiated into dorsal and ventral parts in the ancestral condition; in the *aberrans* group, *Thrypticus,* and *Dolichophorus,* a ventral lobe is projected distally, separated from the dorsal part of the cercus by a deep furrow.

(35) Cerci elongate, tapering, needlelike, considered a derived condition characteristic of the *crassivenis* group.

(36) Female ovipositor: Terga 9 + 10 ancestrally with a pair of apical projections (= acanthophorite remnants?); these projections have been lost in some groups.

(37) Female ovipositor ancestrally membranous; in *Thrypticus,* it is a lanceolate, sclerotized piercing organ.

(38) Larvae as subcortical predators considered ancestral for *Medetera;* larvae as stem miners in grasses considered derived in *Thrypticus* (see Dyte (1959)).

(39) Arista apical considered derived and is such for the Medeterinae. Arista dorsal found in both the Sympycninae and Neurigoninae.

(40) Hypopygium globular, with relatively short surstyli and cerci, and borne at the end of an elongate abdomen considered derived and distinctive for the Neurigoninae.

The species groups treated in this analysis are considered more fully in the taxonomic sections, and their relationships are presented in the cladogram (fig. 150). *Medetera* is the principal genus of the Medeterinae. None of the medeterine genera considered in this analysis are regarded as the sister group of *Medetera*.

The genera *Dolichophorus* and *Thrypticus* are here considered to be derived from *Medetera.* This, of course, makes the genus *Medetera* paraphyletic, since it does not include all its descendant groups. However, both *Dolichophorus* and *Thrypticus* are clearly defined, and *Thrypticus* especially has radiated into an entirely new adaptive zone. I see no reason to alter the current concepts of these three genera, and I shall let *Medetera* stand as a paraphyletic group until an analysis of the world Medeterinae is completed.

Of the *Medetera* species groups considered here, the *nova, petulca,* and *isobellae* groups are united by a rather weak synapomorphy (5), the reduction-loss of the lateral scutellars. This character is homoplastic, occurring also in a subgroup of the *diadema-veles* group. The *petulca* group is especially strongly defined by the male tibia III spur. The synapomorphy uniting the remaining groups is also rather weak, since the fusion of the surstyli to the epandrium (30) occurs in the *isobellae* group and in some members of the *petulca* group. The *aberrans* group, *Dolichophorus,* and *Thrypticus* form a clade strongly defined by synapomorphies (32) and (34). The development of a massive, heavily sclerotized proboscis (3) is a moderately strong synapomorphy uniting the *signaticornis-pinicola, apicalis,* and *diadema-veles* groups. The *signaticornis-pinicola* group is defined by a strong apomorphy, the elongate bases of the epandrial lobes (21). The *crassivenis* group appears to be a specialized offshoot of the *apicalis* group. A number of strong apomorphies (12, 19, 20, 22, 24) unite the *diadema-veles* group.

Bionomics

Although *Medetera* adults sometimes are taken when sweeping low vegetation, they characteristically are found in numbers on such vertical or sloping surfaces as tree trunks, telephone poles, fence posts, walls, and prominent rock outcrops. Here the typical stance of the genus is most evident, with the head always facing upward and the forelegs positioned so that the body is leaning outward from the surface. This stance is achieved with the forelegs extended parallel to the body's long axis, the midlegs held outward in the typical resting position, and the hindlegs close against the body. When walking, the hindlegs are held out from the body, and the body axis becomes parallel to the surface, a more typical dolichopodid orientation. If disturbed, *Medetera* will fly directly outward from the surface and land a short distance nearby. At other times, it will run a short way to the side or backward without turning, always maintaining the upright position. When flying to a new position on a tree trunk, *Medetera* generally lands diagonally higher, about one-fourth to one-third the circumference of the trunk with each move. Thus, it tends to spiral up the trunk in progressive steps. On large, smooth-barked eucalyptus trees in Australia, I have observed *Medetera* individuals gradually working their way up a trunk in a spiral fashion until out of sight. From an indeterminate height, they were seen gently "floating" down, closely paralleling the trunk to its base, there to initiate another ascent. *Medetera* species often congregate at tree bases and rest there. On cool, damp mornings, I have observed numbers of torpid *Medetera* among the mossy irregularities of trunks just above ground level.

The aggregations of *Medetera* on tree trunks serve to facilitate mating, although feeding on soft-bodied arthropods also occurs. Not all trees are equally favored as assembly sites. Only trees "prominent" in some way are likely to function as assembly sites. For example, while walking through woods in New York State, I have, after much searching, found only a few isolated individuals on scattered trees. Yet a large tree in a clearing, such as a picnic ground, may have large numbers of the flies. Size only is not the principal criterion for determining prominence. On a traffic island in the middle of a roadway, I collected more than 40 specimens of *M. vittata* off a young hickory tree not more than 10 meters high, whereas nearby larger trees had none. It was the prominence of the tree, being isolated in the middle of a road, that probably made it an attractive assembly site. In addition, smooth-barked trees seem more attractive than trees with rough, gnarled bark. This is understandable in that individuals would be able to see each other more readily on smooth bark. I have not been able to correlate specific tree species with favored aggregation sites in *Medetera. M. vittata,* for example, has been collected off a wide range of tree species, both native and introduced ornamentals. Rather the tree's prominence, a combination of size, position, and bark texture, seems to be the principal criterion for determining aggregation sites. Certain trees are favored and used repeatedly over a period of years. With some experience, the observer should be able to predict with some accuracy the "*Medetera* trees" at a given site.

Mating in *Medetera* generally occurs at the aggregation sites. Thus, the aggregations of *Medetera* on certain trees should be regarded as leks, or mating assemblies. Lekking behavior appears to be widespread among dolichopodids, with assembly sites or arenas found on such places as mudflats, rocky creeks, and seepages. *Medetera* males appear to be more abundant than females at the leks. Extensive samples of *M. veles* and *M. vittata* taken from single "*Medetera* trees" revealed a male to female ratio of from 2:1 to 3:1. Females apparently are attracted to the leks for mating and then search for suitable oviposition sites, whereas males remain for further encounters. In almost all instances, only one species of *Medetera* was present at a given assembly site. Both the commonly observed *M. veles* and *M. vittata* species assemble on the lower part of trunks, well within the reach of collectors, whereas assemblies of rarer species are seldom seen. Tree canopy branches might prove to be the lekking sites for some of the less common *Medetera* species.

In the typical mating sequence, the male approaches the female from behind, and sometimes approaches other males, only to be repelled. There seems to be no face-to-face courtship, as found in other dolichopodids. The male arches over the receptive female so that he occupies a position dorsal and posterior to her. He then curls his abdomen forward so that the hypopygium is thrust forward between his legs, with the surstyli and cerci clasping the distal end of the female's abdomen. The male rests on his midlegs and hindlegs while the forelegs are held on either side of the female's abdomen, helping to stabilize the coupling, or holding the hypopygial appendages in place. Coupling usually lasts for several minutes, during which time the male thrusts repeatedly forward with his abdomen, and the female rubs her hindlegs against the male's abdomen. A sequence similar to this has been observed in *M. apicalis* (Negrobov, 1971; pers. observ.), *M. vittata* (pers. observ.), *M. aldrichii* (Schmid, 1970), and *Medetera* sp. (Hedström, 1962). The courtship of *aberrans* group males having ornamented tarsi is unknown.

The aggregation trees are rarely those on which females oviposit. Their wide travel in search of oviposition sites would explain the nearly 3:1 ratio of females to males usually taken in Malaise traps. Also, from

sticky traps placed on fallen, scolytid-infested *Picea glauca* in Alaska, the combined catches of *M. maura* and *M. signaticornis* yielded 40 females and only 12 males (specimens from Mark Whitmore, University of Washington). The females probably were attracted to the fallen spruce for oviposition, since many of the specimens appeared gravid.

Females have been observed ovipositing on bark by extending their abdomens into crevices. Many scolytid-associated *Medetera* species have been observed ovipositing at the entrances of bark beetle galleries (e.g., see DeLeon (1935), Schmid (1970, 1971), Krivosheina (1974)). However, considering the diverse rearing records associated with many species, females apparently have fairly catholic tastes regarding oviposition and will deposit eggs in various subcortical environments.

In recent years, literature has been extensive on research into scolytid pheromones (see Wood (1982) and Borden (1982)). Several scolytid predators and parasitoids, including *Medetera,* are known to utilize bark beetle aggregation pheromones as kairomones for locating infested trees (Fitzgerald and Nagel, 1972; Svihra, 1972; Camors and Payne, 1973; Stephen and Dahlsten, 1976; Dahlsten, 1982). Williamson (1971), using synthetic scolytid pheromones, found that *M. bistriata* was able to distinguish among the components of the pheromone bouquet. Furniss et al. (1974, 1979) reported that scolytid antiaggregation pheromones caused reduced attack by *Medetera* sp. Dahlsten (1982) noted the problem of scolytid pheromone traps killing numerous potential predators and parasitoids along with bark beetles.

Although *Medetera* is typically associated with wooded areas, species are also found in more xeric habitats, such as grasslands, prairies, deserts, beaches (especially the *petulca* group and some members of the *diadema-veles* group), and marshlands (*aberrans* group).

Medetera adults are active predators on soft-bodied arthropods and accordingly possess a proboscis as massive and powerful as that of any dolichopodid. Feeding has been recorded on spiders, mites, small chilopods, Collembola, Psocoptera, Thysanoptera, small Diptera (Sciaridae, Psychodidae, Cecidomyiidae), Homoptera, especially aphids, and early instar caterpillars.

Most *Medetera* larvae are subcortical predators and live under the bark of dead or dying trees. Species have also been reared from bracket fungi and decaying cactus, which are extensions of the subcortical environment. Arid-land species have been associated with herbaceous plants and probably act as predators in stems or roots (e.g., *M. veles, M. petulca*). Adults of some Central Asian species have been found in rodent and tortoise burrows (Negrobov, 1966), but their larval associations are not clear. If the phylogenetic analysis is correct, and the phytophagous stem-mining *Thrypticus* has a sister taxon relationship with the *aberrans* group, then the *aberrans* group may have a larval association with grasses or reeds.

Most *Medetera* larvae are predators, although scavenging and saprophagy undoubtedly occur. Kishi (1969) maintained that *Medetera* larvae are scavengers exclusively, and experiments he conducted showed that *Medetera* could not be induced to attack living prey. However, numerous studies (e.g., DeLeon (1935), Schmid (1970-71), Nagel and Fitzgerald (1975), and others) have shown that *Medetera* larvae are indeed voracious predators when encountering prey. *Medetera* has been recorded feeding on and associated with the larvae of Scolytidae, Buprestidae, Curculionidae, Cerambycidae, Sciaridae, and Cecidomyiidae (among others, see Nuorteva (1956, 1959), Beaver (1966), Deyrup (1978), and Deyrup and Gara (1978)).

From extensive forestry rearing studies, *Medetera* has been established as a major predator on scolytid larvae. The attraction of some females to scolytid pheromones further substantiates the association. Without doubt, the genus is of considerable importance as an agent of biological control. The question of host specificity thus arises: Do species of *Medetera* attack specific scolytid hosts? From extensive forestry rearing data, most *Medetera* species appear to occupy a fairly broad larval niche, and there is considerable niche overlap between species. Although some species appear to have a principal association (e.g., *M. aldrichii* on *Dendroctonus, M. bistriata* with the tree genus *Pinus*), almost all the species from the conifer-scolytid-associated *signaticornis-pinicola* group have been reared from various tree and bark beetle hosts. In addition, many species are reared together, often from the same log. For example, from *Dendroctonus ponderosae*-infested pine logs at Invermere, British Columbia (CNC), specimens of *M. pinicola, M. aldrichii, M. flinflon,* and *M. signaticornis* were reared within a few weeks. From extensive Laniel, Quebec, rearings (CNC), up to four species have been reared from the same scolytid-infested log. This is even more significant when considering that closely related species, such as *M. maura* and *M. pinicola,* have often been reared together. Thus, although the data are somewhat fragmentary and the actual larval microenvironments are unknown, there is a suggestion that in some areas several *Medetera* species may occupy a similar broad larval niche.

Intraspecific Variation and Aberrations

The species in this study are defined on the basis of their distinctive male genitalic structure. Although some species have distinctive nongenitalic characters, especially useful in recognizing females, accurate identification usually requires examination of the hypopygium. Many of the new synonymies in this work were species described on characters that, on the basis of the male genitalia, were shown to be intraspecifically variable. Thus, although most species display such characteristics as coloration, chaetotaxy, and venation, they are not as constant as previously thought. Intraspecific variation in *Medetera* is of the following types, not necessarily independent of each other: (1) Geographical-ecological, (2) age, (3) genotypic variability, and (5) aberrations.

In widely distributed species, a geographical-ecological variation is often evident, correlated with habitat changes. The most consistent pattern is a paler coloration, usually yellow legs and a silvery thoracic pruinosity, correlated with drier, sunnier habitats. The widespread *M. veles,* for example, shows a transition from darker coloration, with brown legs in eastern North America, to a distinctly paler form inhabiting the High Plains. In the drier ponderosa pine forests of the Rocky Mountains, *M. aldrichii* displays characteristic brown and gray thoracic vittae, which are darkened and obscured in the coastal rain forests of the Pacific Northwest. Similarily, *M. apicalis* has gold and brown vittae in the ponderosa pine woodlands of central Idaho, which become a dark brown in nearby, higher altitude Engelmann spruce forests. In general, specimens from the northern boreal forests are often blackish (such as *M. signaticornis, M. vidua,* and *M. halteralis*), whereas species from the southwestern arid lands (such as *M. saguaroicola* and *M. similis*) are characteristically pale with silvery pruinosity. Similar habitat effects are evident in Palearctic *Medetera* species.

Coastal winds may have been the selective pressure responsible for the development of brachyptery in a coastal California population of *M. aequalis* (q.v.).

It is not always possible to determine the age of an individual, except in a relative sense, in comparison with other members of a population. Age is reflected externally in two ways: Increased sclerotization and melanization, and increased wear or "rubbing." Teneral or recently eclosed specimens are distinctly less strongly sclerotized, as evidenced by greater body collapse upon drying. More importantly, characteristically dark species appear pale upon emergence. Thus, within a population of mixed age, for example, leg coloration may vary from yellow to dark brown, and it is important to determine whether a specimen has truly pale coloration or is merely teneral. Also, increase in the intensity of brownish wing clouding in females of *M. postminima, M. petulca,* and *M. similis* is undoubtedly a function of age (see Remarks under *M. similis*).

Older specimens frequently appear more rubbed. The waxy body pruinosity, which often forms characteristic vittae, may be worn away with age, exposing the usually darker underlying cuticle. Setae may be broken or missing, as in the delicate hairs of *M. aberrans* femur I or the basiventral setae on femur II of *M. apicalis* males.

Noticeable size variation is frequently observed within a single population or between specimens from different localities. Size variations of 20 percent in such linear measurements as body or wing length are enough to cause individuals to appear significantly different. Some species, such as *M. diadema* or *M. vidua,* display a wide range in body size, up to 33 percent in linear measurement, although most species show a range of less than 10 percent. The quality of larval nutrition is possibly reflected in adult size variation.

Slight variation as in the conformation of wing veins, relative tarsomere lengths, and coloration may reflect genotypic variability within a species, often within a local population. In *M. aldrichii,* for example, a species with an unmistakable hypopygium, the "wing ratio" (m-cu/distal CuA) varies from 1.0 to 2.0. Similarily, in *M. maura,* the first antennal flagellomere varies from subtriangular to subrectangular in shape. However, previous workers have used a narrower range in wing ratio and the shape of the first flagellomere to separate major couplets in keys.

Aberrations or irregularities in development are frequently seen when examining long series of specimens. These aberrations are recognizable as either structural malformations or asymmetry in normally right-left symmetrical structures or appendages. Of course, a normal asymmetry results from the torsion of the male postabdomen, which affects segments 7 and 8 and the epandrium. In addition, species such as *M. pinicola* and *M. maura* have developed characteristically asymmetrical hypandria.

The most common type of aberration is that of wing venation, almost always on one wing only. These include short appendices or "stubs" variously placed on the main veins or crossveins, incomplete formation of veins, and double crossveins. Wheeler (1899) described *M. appendiculatus* based on a single specimen in which the left wing bore an appendix on the m-cu crossvein (the right wing was missing). The specimen is merely an aberrant *M. veles.*

Variation in thoracic chaetotaxy is common. Differing numbers of dorsocentrals and proepisternals on the right and left sides have been found in several *Medetera* species. A specimen of *M. signaticornis* was found to have three scutellar bristles on the right side and two on the left. A *M. veles* specimen was seen to have two aristae arising together from the right antenna, one being three-fourths the normal length.

Aberrations seem more frequent in reared than wild-caught specimens. For example, from a series of 17 *Medetera aldrichii* adults reared by M. Deyrup in Washington, 4 specimens had malformed m-cu crossveins and 2 displayed malformations on both wings. Wing aberrations were common among the extensive Laniel, Quebec, rearings (CNC). Perhaps the rearing environment, such as accelerated development upon bringing specimens indoors, may induce malformations, or a lower survivorship of aberrant specimens in the wild may increase stabilizing selection.

Zoogeography

The Nearctic *Medetera* fauna shows the following distribution patterns:

(1) Holarctic Region. *M. signaticornis, M. apicalis,* and *M. veles* are widespread Holarctic species found across Eurasia and much of North America. *M. veles* and *M. apicalis,* in particular, reflect Chilcott's (1960) conclusions regarding the Nearctic Fanniinae that the Holarctic elements tend to be more far ranging in North America than the solely Nearctic species. *M. pinicola* has a boreal-montane distribution in North America, but it is only found west of the Urals in the Palearctic Region. *M. halteralis* occurs in the northern Nearctic and Siberia.

Several close species pairs (probable sister species) exist between the Nearctic and Palearctic Regions: *M. crassivenis* (boreal Nearctic) — *M. excellens,*M. freyi** (boreal Eurasia); *M. pseudosibirica* (boreal Canada) — *M. sibirica** (Siberia); *M. neomelancholia* (Ontario) — *M. melancholia** (Eurasia); *M. maura* (boreal North America) — *M. obscura* (Eurasia); *M. potomac, M. alpina* (North America) — *M. spinigera,* M. zimini** (Central Asia).

(2) Introductions. Two probable Palearctic introductions to North America, *M. diadema* to the East and West coasts of the United States and *M. truncorum* to the Pacific Northwest, possibly arrived with ships' ballast (for further discussion, see species sections).

There is an increasing probability that exotic *Medetera* species will be introduced throughout the world via intercontinental air traffic. From insects intercepted on flights landing at Dover, Del., I have identified *M. petrophila* from Spain and *M. jacula* from Germany, both common European species (specimens at USNM). Given the attraction of *Medetera* for prominent vertical surfaces, it is not difficult to envisage specimens resting on an airplane fuselage and becoming accidental stowaways inside the plane's cabin.

(3) Nearctic Region. *M. bistriata* ranges through Nearctic pine forests from Honduras to the Northwest Territories. It is particularly common along the Gulf and Atlantic Coastal Plains; thus its far northern distribution is interesting. Although known from only scattered records, *M. aeneiventris* ranges from southern California to Ontario.

(4) Eastern North America. Species associated with the eastern deciduous forests and bounded by the Great Plains include *M. nova, M. vittata, M. isobellae, M. potomac, M. aberrans,* and *M. modesta.*

(5) Western North America. Species associated with the Rocky Mountains and westward include *M. aldrichii, M. dorycondylus, M. platythrix, M. physothrix, M. petulca, M. californiensis, M. longinervis,* and *M. cyanogaster.* Species restricted to the California Coast Ranges and Central Valley include *M. postminima, M. similis, M. xerophila, M. falcata,* and *M. arnaudi.*

(6) Boreal North America. Species with a predominately east-west distribution across the northern coniferous forests include *M. flinflon, M. maura, M. crassivenis, M. vockerothi, M. vidua, M. canadensis,* and *M. nigripes.*

(7) Southwestern Deserts. *M. saguaroicola.*

In summary, the arid High Plains seems to be the principal barrier to the distribution of most Nearctic *Medetera* species, which have either eastern or western distributions or inhabit the boreal coniferous forests arching north of the prairies.

The Nearctic *Medetera* fauna is only part of an essentially Holarctic fauna. Several species and most species groups are found in both the New and Old Worlds, and thus the problem of faunal interchange must be considered.

Matthews (1979) excellently summarized the late Mesozoic and Cenozoic paleogeography of northern North America. From the late Cretaceous to early Tertiary, tropical rain forests extended as far north as 45° latitude, and subtropical mesophytic forests reached even farther north. During this time, broad zones of interchange were available via the Bering Straits to Asia and via Greenland and the Arctic islands to northwestern Europe. *Medetera* is known from the Oligocene Baltic Amber (Meunier, 1907) and probably was widespread at that time.

With climatic changes during the mid-Tertiary, the mesophytic forests and their associated insect faunas retreated southward. The lowland boreal forest appeared in both Asia and North America during the middle to late Miocene, and broad land bridges via the Arctic islands and Beringia were still available. As Matthews (1979) stated, "The roots of the present boreal and arctic insect fauna seem to have been well established by the Miocene." The principal elements of the Holarctic *Medetera* fauna, including some of the widespread species, probably were in place by that time. With further cooling and periodic glaciation during the Quaternary, contacts between the Nearctic and Palearctic were more restricted, although speciation, producing some of the more distinctive continental elements, would have continued.

Medetera undoubtedly has its origin in the early Tertiary Northern Hemisphere mesophytic forests. No members of the genus have been recorded from the old Gondwanaland areas of southern South America (Van Duzee, 1930) or New Zealand (Parent, 1933). Australian *Medetera* specimens I have examined show close affinities with the Oriental fauna and probably are derived from that region. *Thrypticus,* which is considered derived from *Medetera,* has a cosmopolitan distribution, which includes New Zealand and southern South America. However, being a stem miner in grasses, *Thrypticus* may have found suitable habitat in these southern regions, not available to *Medetera. Thrypticus* is also known from Baltic Amber.

The *nova* and *isobellae* species groups are exclusively New World in distribution, the former from eastern North America, Central America, and the Antilles, the latter from eastern North America only. The *petulca* group is widely distributed in the Holarctic Region, especially in semiarid lands. In North America, this group especially has radiated in the California Coast Ranges.

The *aberrans* group predominates in the Neotropics and Orient, and the two Nearctic species must be regarded as outliers of an extensive Neotropical radiation. The *aberrans* group probably had a circumboreal distribution in the warm mesophytic forests of the early Tertiary, but with climatic cooling it retreated into the Neotropical and Oriental Regions. The Palearctic *Dolichophorus* probably evolved from the Old World section of the *aberrans* group.

The *signaticornis-pinicola, apicalis,* and *crassivenis* groups are predominately associated with the circumboreal coniferous forests and include several Holarctic species and close Palearctic-Nearctic species pairs. Faunal interchange via the Bering Straits probably occurred into the Pleistocene.

The *diadema-veles* group is the most derived *Medetera* group and is most diverse in the Palearctic Region, its probable center of origin. Its members have become established in all zoogeographic regions, and some are widespread "tramp" species.

Speciation

The species concept of this study essentially is morphological based on the structure of the male genitalia. The male hypopygium is very complex with an array of characters that usually facilitates immediate species recognition. Since the hypopygium is involved only in sexual selection and not somatic survival (unless it becomes so large as to interfere with other activities, as almost seems the case in some *Medetera* and other dolichopodids), it has been free to elaborate in a distinctive manner. Also, since natural selection is not "channeling" the genitalia into any specific form, total morphological convergence is unlikely. Thus, specimens that display identical hypopygia undoubtedly have a common origin, i.e., they are monophyletic. I therefore regard as intraspecific much of the variation found among members of a single genitalic type. Some of the species presented here may represent a complex of sibling species, but then such problems cannot be resolved on gross morphological grounds alone. Owing to small collection samples, it was impossible to determine whether character displacement had occurred between closely related sympatric species.

Some species show slight variation in genitalic structure, (e.g., *M. petulca, M. veles, M. apicalis*). Unless a distinctive morphological shift has occurred in the hypopygium, I have regarded such variation as intraspecific or clinal. Most species have genitalia that are rather constant in structure, however. For example, I have been unable to detect any hypopygial variation in *M. aldrichii,* even though the species ranges from southern Mexico to Alaska. Thus the species concept must be somewhat flexible to include both species with a constant genitalic morphology and species with a more plastic morphology.

Widespread species of *Medetera* seem to display the greatest variation near their range periphery. In the circumboreal *M. signaticornis,* aedeagal variation has been found in specimens from the northern United States near the species' southern limit. Toward the center of its range, *M. signaticornis* displays a remarkable constancy, such that specimens from Finland, Alaska, and Quebec are indistinguishable. *M. subsignaticornis,* a species undoubtedly derived from *M. signaticornis,* perhaps in isolation in the White Mountains, has undergone sufficient change to assume that complete speciation has occurred.

The rather polytypic *M. veles* and *M. apicalis* also display significant peripheral variation. Some Florida specimens of *M. veles* have black postorbital and postcranial setae and occur together with the more typical pale seta form (map 22). *M. apicalis* bearing a yellow scape and pedicel occurs in the Southeastern United States (map 14) and has been taken off the same tree in association with the typical brown antennal form. In both instances, there is no genitalic difference between the peripheral variants and the sympatrically occurring typical forms. Alleles for the variant color forms may have been fixed in isolated peripheral populations and are maintained and may even spread upon recontact with the parental population. Since the male genitalia have not changed and the color forms occur together, they must be regarded as conspecific. Such peripheral variation may indicate populations that may have speciated if sufficient genetic change had occurred to prevent interbreeding with the parental population.

Key to the Nearctic Species of *Medetera*

1 Coxa I entirely yellow; antennal scape and pedicel yellow; legs yellow ---------- 2
1 Coxa I entirely dark colored (may be pale distally); scape and pedicel yellow or brown; legs various ---------- 3
2 All coxae yellow; abdomen shining deep metallic blue; 2 pairs strong scutellars; aedeagus with distinctive sinuous seminal tract; hypandrium usually with median row of denticles (figs. 96-98); body length >2.0; western N. America ---------31. *M. cyanogaster*
2 Coxae II and III brown; abdomen dark green with gray pruinosity, often with yellowish terga in females; lateral scutellars are weak hairs; surstyli wide, with complex arms and setae as shown; cerci with complex curved apical setae (figs. 16-19); body length < 2.0; eastern N. America ----------1. *M. nova*
3 Body length less than 1.5; with 5 strong dc; surstyli as fused, apically expanded lobe, with median processes and marginal setae as in figure 20; eastern N. America----------2. *M. isobellae*
3 Body length greater than 1.6, usually over 2.0 (if near 1.6, *M. postminima* (California), then only 3 dc); other characters variable ---------- 4
4 Lateral scutellars reduced, hairlike, less than 1/3 length of medians, or totally lost; tarsomere III (2) less than twice length of tarsomere III (1); male tibia III with black anteroapical spur (fig. 7); female wings sometimes with brown clouding between bases R_{2+3} and R_{4+5}; body length always less than 2.5; (*petulca* group) ---------- 5
4 Lateral scutellars at least 1/3 as long as medians; tarsomere ratios variable; male tibia III without apical spur; female wings always hyaline; body length often greater than 2.5---------- 17
5 Entire basal sector of CuA thickened to m-cu in males (fig. 24) ---------- 6
5 Basal sector of CuA in males not noticeably thickened, approximately same thickness as distal CuA------ 7
6 Thoracic setae yellow; thorax metallic blue green with little pruinosity; male tibia III with single anteroapical spur; both hypandrium and aedeagus tridentate apically; surstyli trilobate (figs. 21-23); California----------3. *M. alpina*
6 Thoracic setae black; thorax dark green with dense gray pruinosity; male tibia III with pair of anteroapical hooked spurs; hypandrium with pointed lateral projections; surstyli fused (figs. 25-26); eastern N. America----------4. *M. potomac*
7 Lateral scutellars totally lost, only strong median pair present; female wings usually with brown clouding centered around base of R_{2+3} and R_{4+5} (fig. 153); tibiae and tarsi pale ---------- 8
7 Lateral scutellars present at least as weak hairs; female wings hyaline (in *M. aequalis*, base of wing veins pale and abruptly darkened distally); tibiae and tarsi variable ---------- 10
8 Body length >2.0; 4-5 strong dc; ac at least as long as width between ac rows; pedicel of median epandrial lobe greatly elongate (figs. 31, 34) ---------- 9
8 Body length < 2.0; 3 strong dc; ac strongly reduced to absent; pedicel of median epandrial lobe not elongate (figs. 27-29); California ------5. *M. postminima*
9 Dorsal surstylus in lateral view about same size as ventral surstylus, and with dorsal, subtriangular projection adjacent to distal part of cerci (figs. 30-32); western N. America ----------6. *M. petulca*
9 Dorsal surstylus in lateral view blunt, larger than digitiform ventral surstylus; subtriangular projection absent (figs. 33-35); southern California ----------7. *M. similis*
10 Only 3 strong dc present ---------- 11
10 Four strong dc present ---------- 15
11 Wing ratio 1:3; pedicel of median epandrial lobe greatly expanded (figs. 37, 40)---------- 12
11 Wing ratio approximately 1:2; pedicel of median epandrial lobe collarlike, similar to pedicel of lateral epandrial lobe---------- 13
12 Male tibia III with 2 subequal anteroapical hooked spurs; pedicel of median epandrial lobe rectangular in ventral view (figs. 36-38); western N. America----------8. *M. platythrix*
12 Male tibia III with single hooked anterapical spur; in lateral view pedicel median epandrial lobe expanded, bladderlike (figs. 39-41); western N. America ----------9. *M. physothrix*
13 Wing veins unicolorous; male apical spur on tibia III definitely hooked; cerci with only normal straight setae apically ---------- 14
13 Wing veins pale basally, abruptly darkened beyond level of h crossvein; male apical spur on tibia III straight; cercus with strong curved bladelike apical seta (figs. 42-44); far western N. America 10. *M. aequalis*
14 Epandrial lobes short, adjacent on fingerlike protuberance, and subparallel to surstyli (figs. 45-46); Utah ----------11. *M. utahensis*
14 Epandrial lobes longer, each with separate bases, not subparallel to gonopods; hypandrium membranous mesad (figs. 47-48); California---------12. *M. xerophila*
15 Male tibia III with single short apical spur; dorsal setae of tibia III short, subequal; both epandrial lobes bearing apical bristles ---------- 16
15 Male tibia III with hooklike apical spur subtended by 2d shorter spur, and with outstanding bristle dorsally at 4/5, at least twice as long as adjacent setae; median epandrial lobe developed as short hook, without apical bristle; ventral surstylus subtriangular; surstylar setae in complex arrangement as shown (figs. 49-51); California --------13. *M. falcata*
16 Male apical spur of tibia III short, not hooked; epandrial lobes subequal in length; epandrial seta lying internally, borne on blunt projection; dorsal and ventral surstyli separate at base; ventral surstylus bearing distinctive globular projection with seta curved along its distal margin; cerci elongate, blunt apically (figs. 52-53); N. America ---------14. *M. aeneiventris*
16 Male apical spur of tibia III distinctly hooked; mediobasal epandrial lobe on short moundlike base, apical bristle twice as long as that of laterodistal epandrial lobe; epandrial seta visible laterally; surstyli fused, short, lacking complex setae; cerci subtriangular, with strong apical seta (figs. 54-56); western N. America ----------15. *M. dorycondylus*

17 Thorax bright metallic green, little obscured by pruinosity; dorsal arm of surstyli strongly produced apically, ventral arm reduced to subtending lobe; cerci with ventral projection, separated from dorsobasal part by deep furrow; males sometimes with flattened, modified tarsomeres on foreleg; (*aberrans* group) ---------- 18

17 Thorax dark metallic green at most, obscured by heavy coating of pruinosity; dorsal and ventral surstylar arms usually of subequal length and development; cerci without furrow; male foretarsi never modified ---------- 19

18 All femora yellow; abdomen with pale setulae; male leg I with tarsomeres 2 and 3 flattened and expanded; dorsal surstylar arm expanded, subtriangular, bearing long plumose seta apically (figs. 113-116); eastern N. America ----------16. *M. aberrans*

18 All femora dark metallic green, only "knees" yellowish; abdomen with black setulae; male forelegs without flattened tarsomeres; dorsal surstylar arm blunt apically, with setae as shown (figs. 117-118); boreal N. America ----------17. *M. vockerothi*

19 Male wing with sausage-shaped expansion in basal sector of CuA (figs. 12, 162); cerci prolonged, needlelike; (*crassivenis* group) ---------- 20

19 Male wing with basal sector of CuA of normal uniform thickness; cerci variable, not needlelike ---------- 21

20 Cerci with apical bladelike seta; ventral surstylar lobe with frayed seta; hypandrium apically expanded, with few short setulae apically (figs. 108-112); Maryland----------35. *M. marylandica*

20 Cerci very narrow distally, without apical bladelike seta; ventral surstylar lobe without frayed seta; hypandrium slightly bulging midway, without apical setulae (figs. 105-107); northern N. America ----------34. *M. crassivenis*

21 More than 6 strong dc, gradually decreasing from long setae posteriad into short setulae anteriad (fig. 4); pedicel and scape usually yellow; cerci usually without apical bladelike setae; (*signaticornis-pinicola* group) ---------- 22

21 Usually less than 5 strong dc; anteriormost strong dc (usually at suture, or just presuturally) at least 3 times size of anterior short setulae (figs. 5, 6); antennae usually dark colored; cerci usually with dorsoapical flattened, bladelike setae---------- 31

22 Scape and at least basal pedicel distinctly yellow ---- 23

22 Scape and pedicel black; hypandrium with lateral costae; surstyli broad, ventrally with short, thick curved seta (figs. 85-86); Ontario-27. *M. neomelancholia*

23 Lower calypter with distinct brown rim; hypandrium symmetrical in ventral view---------- 24

23 Lower calypter entirely yellow, with yellow rim; hypandrium distinctly asymmetrical in ventral view, sometimes strongly distorted---------- 29

24 M upcurved toward R_{4+5} basally, 2 veins continuing subparallel to apex (e.g., fig. 157) ---------- 25

24 M appears straight, gradually approaching R_{4+5} to apex (fig. 157); face and clypeus satiny metallic blue; thorax with distinct vittae; abdominal terga with anterior gray pruinose band, and posterior red-brown cuticle; hypandrium subtriangular apically; aedeagus tridentate, lateral teeth rounded; surstyli upcurved from long axis, often bearing lateroventral cuticular denticles as illustrated (figs. 64-66); North America----------20. *M. bistriata*

25 Aedeagus with lateral winglike processes, tridentate; hypandrium expanded somewhat subapicad ------ 26

25 Aedeagus tapering distad, or slightly expanded subapicad; not tridentate ---------- 28

26 Cerci elongate, apex blunt ---------- 27

26 Cerci with dorsal arm bearing spatulate seta; aedeagus narrow with lateral thornlike projections midway; elongate "bottle-brush" projection arises internally from aedeagus (figs. 72-74); western N. America ----------22. *M. aldrichii*

27 Hypandrium expanded subapically with sigmoid indentations; aedeagus sharply tridentate (figs. 57-60); boreal N. America ---------18. *M. signaticornis*

27 Hypandrium with lateral costae before subapical expansion, lacking sigmoid indentations; aedeagus wide; surstyli somewhat truncate ventroapicad (figs. 61-63); New Hampshire ---19. *M. subsignaticornis*

28 Hypandrium in lateral view with dorsomedian tooth or serrate projection; aedeagus somewhat expanded subapicad, with irregular margins; aedeagus with internal "foot-like" process (figs. 67-71); boreal N. America ----------21. *M. flinflon*

28 Hypandrium broad with distal pubescent filaments; face and clypeus steely gray black; male with strong dorsoapical bristles on tibia III; epandrium with ventromedial rectangular projection with row of jagged teeth; male with long black setae on sternum 8 (figs. 82-84); boreal N. America --26. *M. vidua*

29 Hypandrium bizarrely modified, forming 3 dimensional hood with curved internal projections; epandrium with ventral prominence (e.g., fig. 77)---------- 30

29 Hypandrium flattened, with right basal expansion and left subapical internal projection; surstyli with distinctive armlike projections and setal hooks (figs. 75-76); boreal N. America ---------23. *M. pinicola*

30 Hypandrium with curved internal "pseudaedeagus" on left side; aedeagus deflected to right side (figs. 77-78); boreal N. America ----------24. *M. maura*

30 Hypandrium with 3 sharp upturned projections from ventral surface of hypandrium (figs. 79-81); Gaspé, Quebec ----------25. *M. gaspensis*

31 Male basitarsus III with distinct basal anteroventral tooth; hypopygium pyriform, basally inflated; epandrial lobes fused at least basally; epandrial seta reduced or lost; hypandrium and aedeagus elongate, narrow, tapering (e.g., figs. 132, 133); (*diadema-veles* group) ---------- 32

31 Male basitarsus III without basal tooth; hypopygium subrectangular; epandrial lobes with bases separated; epandrial seta well developed; hypandrium elongate, subrectangular, often basally "clasping" aedeagus, and often held out at angle from hypopygium (e.g., fig. 87); (*apicalis* group)---------- 42

32 Smaller species, < 3.5; clypeus dull metallic color, usually covered in pruinosity laterally; wing ratio less than 1.5:1 ---------- 33

32 Large species, > 4.0; clypeus brilliant shining metallic green without lateral pruinosity; wing ratio 2:1; epandrial lobes subtended by internal hooklike structure (figs. 119-121); E. and W. coast U.S.A. ----------36. *M. diadema*

33 Four strong dc, 2d anterior dc distinctly shorter than 1st; thorax covered with dense gray pruinosity, with brown vittae ---------- 34

33 Four or five strong dc, 2d anterior dc never shorter than 1st; thorax variable ---------- 35

34 Clypeus metallic green mesad; legs dark brown to black; ventral surstylar lobe with distinctive forked seta (fig. 122); Pacific Northwest ----------37. *M. truncorum*

34 Clypeus totally concealed by dense gray pruinosity; legs mostly yellow; dorsal surstylar lobe with strong recurved seta; bristles of epandrial lobes expanded apicad, brushlike; when hypopygium held under abdomen at rest, its base projects well beyond tip of abdomen (figs. 123-125); California -------38. *M. arnaudi*

35 First tarsomere I without ventral row of strong setae, setae of uniform size, and rarely longer than width of tarsomere; cercus dorsoapically without cuticular projection---------- 36

35 First tarsomere I of both sexes with distinct ventral row of irregular strong setae, basal 5 or 6 of which are distinctly longer than width of tarsomere (fig. 142); dorsoapical corner of cercus with cuticular projection (figs. 138-141); common, eastern N. America ----------45. *M. vittata*

36 Five strong dc; on leg III, tarsomere 2 usually 2.5 × length of tarsomere 1; blackish species, halteres usually dark; epandrial lobes adjacent, joined only at base; short epandrial seta present; cerci appear excavated basolaterally ---------- 37

36 Four strong dc; on leg III, tarsomere 2 usually less than 2.5 × length of tarsomere 1; color various; halteres usually pale; bases of epandrial lobes usually completely fused; epandrial seta absent; cerci without lateral excavations ---------- 38

37 Surstyli with dorsal protuberance; cerci with apical hook subtended by 2 bladelike setae (fig. 126); boreal N. America----------39. *M. halteralis*

37 Surstylar margin straight, without dorsal protuberance; cerci with dorsoapical curved seta on pedicel, separated by U-shaped excavation from prominent ventral lobe (fig. 127); eastern N. America ----40. *M. modesta*

38 Cerci apically with bladelike, toothed, or hooklike modified seta only; no additional processes ventroapically (e.g., figs. 131, 132)---------- 39

38 Cerci apically with single dorsoapical bladelike seta, subtended ventroapically by various lobelike processes (e.g., fig. 136) ---------- 40

39 Cerci apically with 2 strong, elongate bladelike setae (fig. 131); Arctic Canada----------42. *M. tuktoyaktuk*

39 Cercus with thick, toothed seta at apex; midventrally with bilobate structure bearing short pubescent seta; bristles of epandrial lobes branched apically (figs. 132-135); northern N. America ------43. *M. nigripes*

40 Cerci with long, curved dorsoapical seta ---------- 41

40 Cerci dorsoapically with short bladelike setae, of several configurations, as shown (figs. 143-149); bristles of epandrial lobes with short branches distally; common, widespread N. America ----------46. *M. veles*

41 Dorsoapical seta of cercus on pedicel, separated from ventral lobe by U-shaped excavation; ventral cercal setae as illustrated; short bladelike seta present on apex of ventral surstylus; thorax with 3 bronze vittae and 4 strong dc (figs. 128-129); western N. America ----------41. *M. californiensis*

41 Dorsoapical seta of cercus elongate, curved, tapering; subtended ventroapically by socketed, lobate structure (figs. 136-137); northeastern N. America ----------44. *M. canadensis*

42 Cerci with dorsoapical curved, bladelike seta; surstyli only shallowly cleft, division extending less than 1/3 distance from surstylar tip to distal epandrial lobe ---------- 43

42 Cerci tapering distad, without apical bladelike seta; surstyli deeply cleft, to more than ½ distance from surstylar tips to distal epandrial lobe; ventral surstylar lobe bearing strong external seta at midlength; hypandrium with band of denticles beyond midpoint (figs. 99-101); New York --------33. *M. furcata*

43 Ventral surstylar lobe bearing distinctive curved, "frayed" seta; hypandrium elongate, only slightly expanded subapicad; aedeagus in ventral view elongate, tapering; M gradually arching toward R_{4+5} ---------- 44

43 Ventral surstylar lobe without "frayed" seta, instead with bent bladelike seta; hypandrium broad, with winglike subapical expansion; aedeagus broadly tridentate in ventral view; surstyli with prominent midventral subtriangular projection (figs. 102-104); M rises rapidly to R_{4+5} and runs closely parallel to it in distal 3d of wing (fig. 161); far western N. America ----------32. *M. longinervis*

44 Cerci ventroapically with striated leaflike setae; halteres mostly yellow ---------- 45

44 Cerci ventroapically with distinct digitiform cuticular projection bearing short apical seta; halteres dark (figs. 94-95); boreal N. America ---30. *M. pseudosibirica*

45 Mound of basal epandrial lobe twice as high as that of distal lobe; row of short setae present laterad of epandrial lobe on ventral edge of epandrium; dorsoapical bladelike seta of cercus broad (fig. 93); scape and pedicel yellow; Sonoran Desert ---------- ----------29. *M. saguaroicola*

45 Basal and distal epandrial lobes on short, subequal collarlike bases; dorsoapical seta of cercus narrow, curved (figs. 87-92); scape and pedicel usually brown, sometimes yellow in southeastern U.S.; body color and size variable; widespread in N. America----------28. *M. apicalis*

The *nova* Group

The *nova* species group is distinguished by the following features:

(1) Surstyli divided by deep U-shaped gap, but fused basally.
(2) Surstyli not fused to epandrium, but separated by membranous "hinge line."
(3) Surstyli with complex arms bearing strong bristles and modified setae.
(4) Hypandrium broad.
(5) Aedeagus complex with incurved margins (ventral view) and with overhanging ventromedian process (synapomorphy).
(6) Epandrial lobes located far distally, at edge of epandrium, above gonopods.
(7) Cerci with set of complex curved setae apically.
(8) Thorax bright metallic green; legs mostly yellow.
(9) Antennal scape and pedicel yellow.
(10) All major setae yellow.
(11) Lateral scutellars reduced to weak hairs.
(12) Female abdominal terga 2-3 yellowish.
(13) Female oviscapt (segment 9 + 10) dorsoventrally flattened, apically rounded, without strong marginal projections (synapomorphy).

The *nova* species group apparently is restricted to the New World. Besides the Nearctic *M. nova* considered here, *M. dominicensis** from Dominica, *M. xanthotrichia* from Trinidad, and an undescribed species from Chiapas, Mexico (CNC) belong to the group. I regard *M. dominicensis* as very closely related to *M. nova,* and it may be conspecific. It differs only in the setal configuration of the ventral gonopod and in having a more deeply incised hypandrium. Specimens from Florida and other Caribbean islands will have to be examined to determine if *M. nova* varies clinally into the West Indies. *M. xanthotrichia,* described by Becker (1922a) from a single female (Hungarian National Museum), closely fits the *nova* group, but the type unfortunately was destroyed.

1. *Medetera nova* Van Duzee

Medetera nova Van Duzee, 1919:262 [CAS]

Male: Length 1.7-1.9.

Head: Vertex, frons, face, clypeus bright metallic green, covered with dense gray pruinosity; major setae yellow brown; eyes red, facets uniform; pedicel and scape yellow; 1st flagellomere brown, subrectangular; arista apical; palpi brown, proboscis yellow; single row of pale postorbitals, with scattered pale setae on postcranium.

Thorax: Dorsum, upper pleura bright metallic green, covered with gray pruinosity; pleura becoming brownish ventrally; all setae yellow; 7-8 pairs ac, about as long as width of ac band; 2 strong dc bordering mesoscutal depression, 2 subequal shorter dc anterior, with 4-5 short setulae anteriormost; median scutellars strong, laterals as weak hairs, less than 1/4 length of medians; 2-3 pale ppls.

Legs: Coxa I entirely yellow; coxae II and III brown, each bearing pale lateral seta; legs entirely yellow, distal tarsomeres infuscated; I: 0.65; 0.55; 0.2/ 0.15/ 0.1/ 0.075/ 0.075; II: 0.7; 0.65; 0.25/ 0.2/ 0.15/ 0.1/ 0.1; III: 0.75; 0.8; 0.15/ 0.3/ 0.15/ 0.1/ 01; male tibia III without apical spur.

Wings: 1.8 × 0.85 (fig. 151); M gradually curves up to R_{4+5}, subparallel distally; wing ratio: 2.5; lower calypter pale with pale setae; halteres pale yellow.

Abdomen: Dark green with dusting of gray pruinosity, with pale setulae; hypopygium brownish, appendages yellow; epandrium rectangular, SH = EL (fig. 16); epandrial lobes relatively short, adjacent with separate bases, located far distally, above base of surstyli; epandrial seta with short cylindrical base, located slightly basad of epandrial lobes; hypandrium broad, bilobate apically (fig. 17); aedeagus distinctive, in lateral view (shaded in fig. 16), dorsally curved with distal projection, ventromedianly with overhanging projection; aedeagus in ventral view expanded apically with incurved lateral margins (fig. 18); surstyli fused basally, with distinct hinge line on epandrium; dorsal and ventral surstyli divided by deep U-shaped excavation, and bearing elongate arms with complex projections and setae as shown; cerci roughly rectangular, with complex curved apical and subapical modified setae as illustrated; in dorsal view, flattened diamond-shaped seta arises medianly and subapically (fig. 19).

Female: Similar to male; many specimens have abdominal terga 2-3 with irregular yellow brown medianly, becoming metallic green laterally, especially in apparently teneral specimens; abdominal segment 10 (oviscapt) flattened, ovoid as in figure 11, without strong projection; cerci somewhat hidden.

Distribution: Eastern North America south of taiga (map 1); 85 specimens examined; collection dates: iv-vii.

Remarks: The male holotype of *M. nova* was taken at Great Falls, Va. Although Van Duzee mentioned only one pair of scutellars, a second pair, the laterals, are present as weak hairs.

I frequently have found this species on dead standing trees along riverbanks and in swampy areas.

The *isobellae* Group

This group consists of one described species, the Nearctic *M. isobellae,* and is distinguished by the following features:

(1) Surstyli fused into expanded apical lobe (apomorphy).
(2) Modified setae developed medianly on apical surstylar lobe.
(3) Epandrium elongate, tapering distally.
(4) Epandrial lobes with adjacent but separate bases and borne forward on epandrium such that length SH is more than twice length HL.
(5) Cerci lobate.
(6) Lateral scutellars reduced, hairlike.
(7) Small, less than 1.5
(8) Female abdominal terga 2-4 often appearing yellowish.

In hypopygial structure, the *isobellae* group appears somewhat isolated from other North American *Medetera* species. The fusion of the surstyli into an expanded apical lobe bearing median modified setae constitutes an autapomorphy for the group. In terms of size, reduced lateral scutellars, and tarsal ratios, it bears certain resemblances to the *petulca* group, but it lacks that group's important synapomorphic character of the male tibia III spur.

2. *Medetera isobellae*, sp. nov. [MCZ]

Male: Length 1.2-1.4.

Head: Vertex, frons, face, clypeus metallic green, covered with gray-brown pruinosity; eyes dark red, facets uniform; antennae dark brown, 1st flagellomere subrectangular, arista apical; palpi, proboscis dark brown; row of short, pale postorbitals.

Thorax: Dorsum, pleura dark brown with metallic green reflections and covered with dense brown pruinosity; 8-10 pairs ac, shorter than width of ac band; 5 strong dc: 2 long posteriors bordering mesoscutal depression, 3 shorter subequal dc anteriorly, with 3-4 setulae anteriormost, being at least half size of anterior dc; 2 pairs of scutellars, laterals as hairs about 1/3 length of medians; 2-3 dark ppls.

Legs: Coxae, legs dark brown to black, femoral "knees" and basal tarsomeres yellowish; I: 0.4; 0.35; 0.15/ 0.1/ 0.05/ 0.05/ 0.04; II: 0.45; 0.3; 0.15/ 0.12/ 0.08/ 0.05/ 0.04; III: 0.4; 0.45; 0.10/ 0.18/ 0.10/ 0.06/ 0.06; male legs without distinctive ornamentation.

Wings: 1.2 × 0.5; M gradually approaches R_{4+5}, becoming subparallel apically; wing ratio: 1:2.5; lower calypter pale with brown rim and pale setae; halter stem pale yellow, club somewhat infuscated.

Abdomen: Dark brown with metallic green reflections, covered with brown pruinosity; hypopygial capsule black with brownish appendages; epandrium in lateral view elongate, flattened dorsoventrally, EL = EH; SH = 2 (EL); epandrial seta near base of hypandrium (fig. 20); epandrial lobes with adjacent but separate small, collarlike bases, and set forward near base of gonopods; hypandrium elongate, expanded apically in ventral view; aedeagus elongate; surstyli appear as fused, apically expanded lobe, dorsal and ventral components not distinguishable; mesad on surstylar lobe are various processes and setal projections, marginal external setae as illustrated, with strong dorsal seta projecting over distal cerci; cerci lobate, blunt.

Female: Similar to male but abdominal terga 2 and 3 appear partially yellowish discad.

Distribution: Eastern North America (map 2); holotype, male; allotype, female: MASSACHUSETTS: Middlesex Co., Lincoln, 24-viii-1982, E. T. Armstrong, coll.; Malaise trap; paratypes: 2 males, 2 females, same data except 4 to 8-viii-1982; paratype, male: LOUISIANA: Harahan, 20-iii-1944; paratype, male; NEW HAMPSHIRE: Durham, v-4-1951; reared from rotted gray birch; (all MCZ); isolated females from Colesville, Md. (USNM), and Tarpon Springs, Fla. (CNC), are perhaps *M. isobellae.*

Remarks: This species is named after my wife, Isobelle. The Massachusetts specimens were taken from a Malaise trap set at the edge of a second-growth deciduous forest. *M. isobellae* is probably widespread and abundant; attention to the "micro-component" of Malaise traps should reveal this. I have not been able to associate this species with any of the tiny medeterine species described by Robinson (1975) from Dominica.

The *petulca* Group

The *petulca* group of species is characterized by the following features:

(1) Male tibia III with short anteroapical spur, often hooked, usually subtended by shorter secondary spur (fig. 7); (synapomorphy).
(2) Lateral scutellars reduced to weak hairs, less than 1/3 length of medians, or totally lost.
(3) Acrostichals (ac) reduced or lost in some species (apomorphy).
(4) Tarsomere III (2) less than twice length of tarsomere III (1).
(5) Small, less than 2.5 in length.
(6) Epandrium wide in ventral view, somewhat dorsoventrally flattened.
(7) Epandrial lobes occupy positions laterad of each other, so that basal lobe is median and distal lobe is lateral; median epandrial lobe is often greatly modified in some species (apomorphy).
(8) Hpyandrium broad in ventral view, often expanded apically.
(9) Abdomen somewhat dorsoventrally flattened.
(10) Wings with M gradually approaching R_{4+5}, not sharply upcurved (e.g., figs. 24, 152).
(11) Males of some species with CuA thickened for entire length (apomorphy).
(12) Some females with brown wing clouding (fig. 153).
(13) Female abdominal terga 2-4 sometimes yellowish.
(14) Female abdominal terga 9 + 10 usually with pair of apical projections.

The *petulca* group is broadly Holarctic in distribution, as are assemblages within the group. Although various subgenera have been erected to accommodate members of the group, I believe that recognizing only informal species groupings is better.

Negrobov (1966) erected the subgenus *Asioligochaetus* to accommodate the central Asian species *M. vlasovi,** described from a single female. This species has brown wing clouding, three pairs dc, and only the median scutellars, the laterals being totally lost. It is clearly related to the Nearctic assemblage containing *M. postminima, M. petulca,* and *M. similis,* which share these features and, among themselves, hypopygial similarities.

The subgenus *Lorea* (Negrobov, 1966), with two described central Asian species, *M. spinigera** and *M. zimini,** is characterized by the entire basal sector of CuA thickened in males, short blunt cerci, and two strong median scutellars with weak lateral side hairs. The two Nearctic species that share these characters are *M. potomac* and *M. alpina.*

The genus *Oligochaetus* was erected by Mik (1878), with the Palearctic *M. plumbella* as its type, to accommodate those *Medetera* species with two strong median scutellars and the laterals either reduced to weak side hairs or totally lost. As previously regarded, *Oligochaetus* was a polyphyletic grouping, since the reduction-loss of the lateral scutellars has occurred independently at least twice in the *petulca* group and in a Palearctic assemblage of the *diadema-veles* group, to which *M. plumbella* belongs. The following Palearctic species, once placed in *Oligochaetus,* are regarded as members of the *petulca* group: *M. prjachinae,** *M. chrysotimiformis,** *M. leucarista,** *M. flavirostris,** *M. albescens, M. turkmenorum,** *M. araneipes* (?), *M. perplexa* (?), and *M. turkestanica* (?).

Besides the Nearctic species mentioned here, the following species are also placed in the *petulca* group: *M. physothrix, M. platythrix, M. aequalis, M. falcata, M. aeneiventris, M. dorycondylus, M. xerophila,* and *M. utahensis.* No Holarctic species are recognized.

Except for two species, all Palearctic members of the *petulca* group are from the arid or semiarid regions of Soviet Central Asia, Mongolia, and Egypt. This corresponds well with the group's predominance in the more arid regions of western North America, often in association with grasslands or xeric vegetation.

It should be noted that within the *petulca* group, two distinctly different forms of secondary sexual wing modifications have developed independently in the males and females of certain species. A thickened basal CuA occurs in some males, whereas brown wing maculations or clouding is found in some females.

In the following descriptions, all species have these features in common, which will not be repeated: Scape, pedicel, and 1st flagellomere brown to dark brown, with fine pubescence; 1st flagellomere subrectangular, arista apical; palpi and proboscis dark brown, glabrous; postorbitals in single row, short and dark dorsally, becoming long and pale ventrally; few scattered long, pale setae on lower postcranium; upper calypter pale yellow with pale setae; halteres yellow.

3. *Medetera alpina* Harmston and Knowlton

Medetera alpina Harmston and Knowlton, 1941:95 [SMEK]

Male: Length 1.7.

Head: Vertex, frons, face, clypeus metallic green, covered with gray pruinosity; all major setae pale yellow.

Thorax: Dorsum, pleura metallic blue green, with thick dusting of gray pruinosity; all setae yellow; 7-9 pairs ac, approximately length of ac band; 3 strong dc, 2 subequal bordering mesoscutal depression, 1 shorter anterior; 4 scutellars, laterals less than 1/2 medians; 1-2 weak, pale ppls.

Legs: Coxae brown, legs yellow, with distal tarsomeres infuscated; I: 0.6; 0.6; 0.2/ 0.15/ 0.1/ 0.1/ 0.1; II: 0.65; 0.6; 0.35/ 0.2/ 0.15/ 0.1/ 0.1; III: 0.7; 0.7; 0.25/ 0.35/ 0.2/ 0.1/ 0.1; tibia III anteroapically with short, black, hooked spur, about as long as tibial width.

Wings: 1.8 × 0.75 (fig. 24); hyaline; M gently arched toward R_{4+5}, subparallel to apex; base of CuA thickened along entire length, tapering to normal thickness just beyond m-cu; wing ratio: 1:2.

Abdomen: Dark metallic green with dusting of gray pruinosity; hypopygium dark brown glabrous with yellow appendages (fig. 21); epandrium short, stubby; EH > HL; epandrial seta strong, epandrial lobes unequal in length, larger basal lobe on elongate pedicel, subtended by distal shorter lobe, and 2 fused basally; epandrial lobes separated from surstyli by deep groove; hypandrium broad, with distolateral and single median prolongations (fig. 23); aedeagus trident shaped distad (fig. 22); surstyli short, lobate; ventral surstylus with 2 lobes, stronger lobe bearing prominent, somewhat flattened, and curved setae; strong setae arise from gap between dorsal and ventral surstyli and from external base of dorsal surstylus; cerci blunt, decumbent.

Female: Unknown.

Distribution: Known only from male holotype, taken at Alpine, Calif., 9-vii-1929 (map 3).

Remarks: Holotype missing left legs I and II, and left leg III is glued to point.

4. *Medetera potomac*, sp. nov. [USNM]

Male: Length 2.2-2.4.

Head: Vertex, face, frons dark metallic green, covered with brown-gray pruinosity.

Thorax: Dorsum and pleura dark metallic green with gray-brown pruinosity; setae black; dark-brown vitta extends over ac band to mesoscutal depression; 6-8 pairs ac, their length about equal to width of ac band; 4 strong dc, posterior 2 longer than subequal anterior 2, with some short setulae anteriormost and extending toward humeral callus; 4 scutellars, laterals half length of median pair; 2 pale ppls.

Legs: Coxae, femora black to before "knees"; remainder of legs yellow except for darkened distal tarsomeres; I: 0.7; 0.6; 0.25/ 0.15/ 0.1/ 0.075/ 0.1; II: 0.8; 0.75; 0.35/ 0.2/ 0.1/ 0.075/ 0.075; III: 0.8; 0.8; 0.25/ 0.3/ 0.2/ 0.1/ 0.1; tibia III with subequal pair of dark anteroapical hooked spurs.

Wings: 2.1 × 0.85; M gently arched up toward R_{4+5}, subparallel in distal part; base of CuA thickened for entire length, tapering to normal width just before m-cu (as in fig. 24); wing ratio: 1:1.5.

Abdomen: Dark metallic green with little pruinosity; setulae black; hypopygium dark brown with short dark appendages; epandrium ovate laterally (fig. 25), somewhat flattened dorsoventrally; EH = EL; epandrial seta present; distal epandrial lobe separated from stronger basal epandrial lobe; hypandrium broad apically, with pointed lateral projections (fig. 26); aedeagus elongate, tapering; surstyli short, stubby, fused; hinge line of surstyli on epandrium evident; cerci short, blunt, with some apical setae.

Female: Without basal thickening of CuA and T III apical spurs.

Distribution: Eastern United States: Potomac Basin and Illinois (map 3); holotype, male: DISTRICT OF COLUMBIA: Washington, Roosevelt Island, 1-vi-1980, H. Robinson, collector; allotype, female, same data (USNM); paratypes (4): 2 males: ILLINOIS: Mason Co., Sandridge State Park, 12-vi-1976 (INHS); 1 male: MARYLAND: Plummer Island, 24-v-1916; 1 female, Montgomery Co., Bethesda, 22-vii-1972 (USNM); female (not paratype) from Highlands, N.C., 7-viii-1957 (CNC) is probably this species.

Remarks: Further specialized collecting should increase the known distribution of this undoubtedly widespread species.

5. *Medetera postminima* Steyskal

Medetera minima Van Duzee, 1925:180 (preocc. de Meijere, 1916:259)
Medetera postminima Steyskal, 1967:224 (nom. substit.) [CUIC]

Male: Length 1.6-1.8.

Head: Vertex, frons, face dark metallic green, covered with brown pruinosity; clypeus shining dark brown with some pruinosity laterally.

Thorax: Dorsum, pleura brown with green-bronze reflections, covered in gray pruinosity; bronze vitta with violet reflections extending over ac band and across mesoscutal depression to scutellum; bronze vittae present laterally over anterior dc; 5 pairs very short (barely visible) ac; 3 strong dc, decreasing somewhat anteriorly, with short setulae anteriormost; only 1 sa and 1 np, these thoracic bristles usually paired in *Medetera;* only 2 strong median scutellars, laterals totally lost; 2-3 pale ppls.

Legs: Coxae brown, remainder of legs yellow to infuscated; distal tarsomeres darkened; I: 0.45; 0.45; 0.25/ 0.15/ 0.1/ 0.075/ 0.075; II: 0.6; 0.6; 0.35/ 0.2/ 0.15/ 0.1/ 0.075; III: 0.6; 0.65; 0.2/ 0.3/ 0.15/ 0.1/ 0.075; tibia III with black anteroapical hooked spur.

Wings: 1.4 × 0.55 (fig. 152); hyaline; M gradually approaches R_{4+5}; wing ratio: 1:2.

Abdomen: Dark brown with green-bronze reflections and short, brownish setulae; hypopygium dark brown; ovate in lateral view (figs. 27, 28); epandrial seta nearer base of hypandrium than epandrial lobes; median epandrial lobe longer than lateral; hypandrium widened apically (fig. 29); aedeagus elongate; surstyli fused, with dorsal and ventral parts represented apically by digitiform lobes; surstyli appear to have weak hinge line at attachment to epandrium (on some specimens, surstyli are somewhat medianly infolded); cerci elongate with strong apical seta.

Female: Lacks apical spur on tibia III; distinct brown cloud centered between bases of R_{2+3} and R_{4+5}, with faint brownish wash extending from this basal cloud, medianly to wing apex; this brown wing coloration is more intense in older specimens, wings of teneral females appearing almost hyaline.

Distribution: California: Coast Ranges, Central Valley, Santa Cruz Island, and Sierra Nevada Range (map 2); 33 specimens examined; taken from sea level to 1530 m; collection dates: 27-vi to 28-viii.

Remarks: Van Duzee described *M. postminima* (as *M. minima*) from a single male taken at Felton, Santa Cruz Mountains. The holotype is badly soiled and missing the head and legs L II and R II.

6. *Medetera petulca* Wheeler

Medetera petulca Wheeler, 1899:21 [AMNH]
Medeterus nitidiventris Van Duzee, 1919:264, SYN. NOV. [CAS]

Male: Length 2.2-2.4.

Head: Vertex, frons, face, clypeus dark brown with green reflections, covered with gray pruinosity; clypeus bare mesad.

Thorax: Dorsum, pleura dark brown with metallic green reflections, covered with dense gray pruinosity; bronze-violet vitta extends over ac band, across mesoscutal depression, and onto scutellum (fig. 3); 8-10 pairs ac, as long as width of ac band; 4 (sometimes 5) strong dc, decreasing anteriorly, with small setulae anteriormost; only strong median scutellars present, laterals totally lacking; 2-3 pale ppls.

Legs: Coxae and femora dark brown; femoral "knees," tibiae, tarsi yellow, distal tarsomeres darkened; I: 0.7; 0.7; 0.3/ 0.2/ 0.15/ 0.1/ 0.1; II: 0.8; 0.8; 0.45/ 0.25/ 0.2/ 0.1/ 0.1; III: 0.85; 1.0; 0.25/ 0.4/ 0.2/ 0.1/ 0.1; tibia III with black anteroapical hooked spur, as long as width of adjacent basitarsus.

Wings: 2.4 × 1.0; male wing hyaline; M and R_{4+5} subparallel near apex; wing ratio: 1:2.

Abdomen: Dark brown with metallic green reflections, covered with thin dusting of gray pruinosity; hypopygial capsule dark brown, dorsoventrally flattened, oblong in lateral view (fig. 30); EL almost twice EH; epandrial seta strong, projecting over epandrial lobes; lateral epandrial lobe with short pedicel bearing elongate seta, whereas median epandrial lobe is thicker, with elongate pedicel bearing short, bladelike seta; hypandrium broad apically, with wide U-shaped excavation (fig. 32); aedeagus bulging laterally (fig. 31); surstyli almost entirely fused; dorsal and ventral lobes subequal in lateral view; dorsal surstylar lobe with subtriangular development along dorsal surface adjacent to cerci; cerci blunt, with short apical setae.

Female: Lacking apical spur of tibia III; female wings with distinct brown clouding between bases of R_{2+3} and R_{4+5} (fig. 153). [See remarks under *M. similis* for further discussion of female wings.]

Distribution: Western North America (map 4) from southern British Columbia to central California, easternmost record from Yellowstone National Park; 187 specimens examined; collection dates: v-viii in Washington, British Columbia; iv-vi in California.

Biology: Adults have been collected on *Salix* and on cultivated apple trees. A series of *M. petulca* was reared from *Lupinus arboreus* in association with the curculionid *Rhyncolus pallens,* from Pt. Reyes, Marin Co., Calif. (UCB).

Intraspecific Variation: The dorsal, subtriangular development of the surstyli is distinct and prominent in the Pacific Northwest (Washington, British Columbia), becoming less distinct down the coast toward California. Around San Francisco, it appears as a slight bump. Occasionally its prominence has a sharp point.

Remarks: Wheeler (1899) described *M. petulca* from a single male taken at Colfax, Wash. In his description, he noted, "Front dusted with gray, produced into a high four-sided pyramidal projection, bearing the ocelli at its summit." This pyramidal projection has been used as a specific character in subsequent keys and makes identification of this species impossible. Examination of the holotype, however, revealed the true nature of this curious projection. In addition to the head being collapsed upon drying, the greater part of the vertex and the dorsal and posterior parts of the eyes had eroded,

leaving an almost perfectly symmetrical, ocelli-bearing pyramid. The hypopygium, however, is identical to that of a common, nonpyramidal species.

The male holotype of *M. nitidiventris* from San Francisco has a hypopygium identical to that of *M. petulca* but with a reduced surstylar development, as discussed here.

7. *Medetera similis* Van Duzee

Medetera similis Van Duzee, 1919:261 [CAS]
Medeterus cuneiformis Van Duzee, 1919:263, SYN. NOV. [CAS]

Male: Length 2.1-2.3.

Head, thorax, legs, wings, abdomen similar to those described for *M. petulca*. In general, *M. similis* is somewhat smaller and is slightly paler.

Wings: 2.1 × 0.9; male wing hyaline.

Hypopygium: Similar to that of *M. petulca* except narrower apically, dorsal surstylar lobe much wider than ventral lobe (which may be incurved in some specimens), and no subtriangular development of dorsal surstylus above cerci (figs. 33-35).

Female: Lacks apical spur of tibia III; wing with distinct brown clouding centered between bases of R_{2+3} and R_{4+5} (also see following).

Distribution: Southern California: San Luis Obispo, Santa Barbara, Fresno, Los Angeles, Riverside, Orange, and San Diego Counties, including Santa Cruz Island (map 4); 91 specimens examined; collection dates: iv-vii.

Biology: A series from Santa Cruz Island was taken on *Prunus lyonii;* one specimen had a thrips in its mouth.

Intraspecific Variation: Females taken from Santa Cruz Island display wing clouding centered around base of R_{4+5}, not between R_{2+3} and R_{4+5}, as is characteristic on mainland; females from island show range of wing clouding intensity, as discussed here.

Remarks: Van Duzee described *M. similis* from a male taken at Los Angeles on 27-iv-1915. The female allotype, same date and locality, displays an almost imperceptible clouding centered around the bases of wing veins R_{2+3} and R_{4+5}. The female holotype of *M. cuneiformis* also was taken at Los Angeles on 27-iv-1915 (no male described), but displays a distinct brown clouding around the bases of R_{2+3} and R_{4+5}. In all other respects, females of the two species are identical. I regard the two species as synonyms. Series collected from other southern California localities where *M. similis* males were present show a range of wing clouding intensity in associated females from faint to dark brown. This phenomenon is also noted in the closely related *M. petulca.* The intensity of clouding is perhaps a function of age. Hardy (1960), observing the Australian dolichopodid *Heteropsilopus ingenuus,* noted that recently eclosed individuals had transparent wings and that the species' characteristic wing maculations developed over a period of days.

M. similis is closely related to *M. petulca* and they are possible sister species.

8. *Medetera platythrix,* sp. nov. [CNC]

Male: Length 1.6-1.9.

Head: Vertex, frons, face, clypeus dark metallic green, covered with dense gray pruinosity; clypeus with less pruinosity.

Thorax: Dorsum, pleura metallic blue green, covered with gray pruinosity, pleurae becoming brown ventrally; setae black; 6-7 pairs ac, as long as width of ac band; 3 strong dc, 2 longer subequals bordering mesoscutal depression, 1 somewhat shorter near suture; 1 pair of strong median scutellars, laterals reduced to weak hairs, less than 1/5 length of medians; 2 pale ppls.

Legs: Coxae, femora dark brown; femoral "knees," tibiae, basal tarsomeres yellow to infuscated; distal tarsomeres dark; I: 0.6; 0.55; 0.3/ 0.2/ 0.1/ 0.1/ 0.075; II: 0.7; 0.6; 0.3/ 0.15/ 0.10/ 0.075/ 0.1; III: 0.7; 0.75; 0.2/ 0.3/ 0.2/ 0.1/ 0.1; tibia III anteroapically with pair of black, hooked spurs, one about twice length of other.

Wings: 1.8 × 0.8; hyaline; M gently arches toward R_{4+5}, subparallel apically; wing ratio: 1:2.

Abdomen: Dark green with thin dusting of gray pruinosity; hypopygium black with brownish appendages; epandrium subrectangular in lateral view (fig. 36); epandrial seta midway between epandrial lobes and hypandrial hinge; median epandrial lobe with greatly enlarged base, appearing rectangular and flattened in lateral view, bearing seta medianly (fig. 37); base of lateral epandrial lobe much shorter; hypandrium with 3 lobes distally (fig. 38); aedeagus elongate; surstyli short, stubby; ventral surstylus wide, bearing curved, bladelike seta as illustrated; dorsal surstylus projecting distally beyond ventral, and with incurved setal-bearing processes; cerci short, blunt, bearing apical seta.

Female: Tibia III without apical spurs; wings as in male.

Distribution: Western North America (map 6); holotype, male; allotype, female: COLORADO: 5 miles south of Boulder, 1740 m, 21-27-vi-1961, W. R. Mason, coll. [CNC];

14 male, 2 female paratypes: BRITISH COLUMBIA: Robeson; CALIFORNIA: Cedar Pass, Warner Mtns., 1800 m; Mt. Shasta, McBride Springs, 1440 m; Mt. Laguna, San Diego Co.; Woodford, Alpine Co.; Sierra Nat. Forest, Mariposa Co., 1500 m; Glendale; COLORADO: Mt. Vernon, near Golden, 2160 m; MONTANA: White Pine, Sanders Co.; WASHINGTON: SE Chewelah, Stevens Co.; (paratypes deposited CNC, UCB, MSUE, WSU, USNM, MCZ); collection dates, all localities: vi-viii.

Biology: Locality elevation data indicate montane habitats, mostly above 1400 m.

9. *Medetera physothrix*, sp. nov. [CAS]

Male: Length 1.5.

Head: Vertex, frons, face dark metallic green, covered with silvery pruinosity; clypeus shining dark brown.

Thorax: Dorsum dark brown, with metallic green reflections, covered with gray pruinosity; pleura becoming dark brown ventrally; weak brown vitta over ac band and extending to scutellum; 6-8 pairs ac, longer than width of ac band; 3 strong dc, decreasing slightly in size anteriorly; 2 strong median scutellars, laterals reduced to hairs, less than 1/4 length of medians; 2 pale ppls.

Legs: Coxae, femora brown; "femoral knees" and remainder of legs yellow, distal tarsomeres darkened; I: 0.45; 0.45; 0.2/ 0.1/ 0.1/ 0.05/ 0.075; II: 0.55; 0.5; 0.3/ 0.1/ 0.1/ 0.05/ 0.075; III: 0.6; 0.65; 0.2/ 0.3/ 0.15/ 0.075/ 0.1; tibia III with strong anteroapical black hooked spur.

Wings: 1.4 × 0.6; hyaline; M gradually approaches R_{4+5}, subparallel near apex; wing ratio: 1:2.5; stalk of halter somewhat infuscated.

Abdomen: Dark brown with green metallic reflections, covered by dusting of gray pruinosity; hypopygium dark brown; epandrium oblong in lateral view; epandrial seta nearer epandrial lobes than hypandrial hinge; base median epandrial lobe expanded, bladderlike in lateral view (fig. 39); base of lateral epandrial lobe short; hypandrium expanded apically as shown (fig. 41); aedeagus wide basally, narrowing distally (fig. 40); surstyli fused basally; distally, dorsal surstylar lobe extends beyond ventral, with setae as illustrated; cerci blunt, bearing some ventral setae in addition to usual dorsals.

Female: Lacks apical spur of tibia III; wings also hyaline.

Distribution: Western North American (map 6); holotype, male: WASHINGTON: Okanogan Co., 7 miles se Wauconda, 23-vii-1975, 900-1025 m, W. J. Turner, coll. [WSU, deposited in CAS]; 18 male, 17 female paratypes: CALIFORNIA: West of Winters, Yolo Co.; Cache Creek, Yolo Co.; Felton, Santa Cruz Co.; IDAHO: Lewiston; Camp Creek, Valley Co.; WASHINGTON: Coulton, plots 2, 3, 5, virgin prairie study project; (paratypes deposited in UCD, WSU, USNM); collection dates: v-vii.

Biology: Specimens from Coulton, Wash., collected from virgin prairie; in Idaho, specimens taken off *Purshia tridentata* (Rosaceae).

10. *Medetera aequalis* Van Duzee

Medetera aequalis Van Duzee, 1919:265 [CAS]

Male: Length 1.9-2.2.

Head: Vertex, face, frons dark brown, covered with brown-gray pruinosity; clypeus with shining black, raised median ridge, in distinct contrast to more receding pruinose lateral margins.

Thorax: Dorsum and pleura dark metallic green, covered in gray-brown pruinosity; bronze vitta with violet reflections over ac band and extending across mesoscutal depression to scutellum; bronze vittae also laterally over anterior dc area; 8 pairs very short ac; 3 strong dc, decreasing anteriorly with short setulae anteriormost; only 1 sa and 1 np, these thoracic setae usually paired in *Medetera;* 2 strong median scutellars, with laterals reduced to weak hairs, or totally lacking; 2 pale ppls.

Legs: Coxae and femora dark brown; femoral "knees," tibiae, tarsi yellowish to brown, sometimes rather dark; I: 0.7; 0.6; 0.3/ 0.15/ 0.1/ 0.075/ 0.075; II: 0.7; 0.8; 0.45/ 0.25/ 0.15/ 0.075/ 0.075; III: 0.85; 0.95; 0.25/ 0.4/ 0.2/ 0.1/ 0.1; tibia III with anteroapical straight spur, as long as width of basitarsus.

Wings: 1.8 × 0.75 (but see below); (figs. 154, 154a); wing veins in basal stalk area pale yellow, changing abruptly to dark brown on wing blade, thus giving impression of basal weakening; M approaches R_{4+5} gradually, 2 veins becoming subparallel toward apex; wing ratio: 1:2.

Abdomen: Black with green-bronze reflections; shining, with little pruinosity; setulae short, brownish; hypopygial capsule dark brown; epandrium ovate (fig. 42); epandrial seta near hypandrial hinge; epandrial lobes subequal, with short, collarlike bases (fig. 43); hypandrium slightly expanded apically (fig. 44); aedeagus narrow, tapering; surstyli fused basally, lobate distally, with setae as illustrated; cerci bearing curved bladelike apical setae, subtended by comblike structure and 2 ventral setae facing surstyli.

Female: Lacks apical spur tibia III; in addition to distinct color change in wing veins between stalk and blade, female wing varies from hyaline to diffuse brown cloud centered between R_{2+3} and R_{4+5}.

Distribution: Pacific coastal States from Oregon to southern California (map 5); 116 specimens examined; collection dates: iv-vi.

Biology: Recorded from various xeric habitats, including sand dunes (Oreg., Calif.) and beaches (Calif.).

Intraspecific Variation: Lateral scutellars may be as weak hairs or totally lost; size of apical cercal hook varies in specimens; variation in intensity of wing clouding in females may be function of age (see Remarks under *M. similis*).

A series of 10 males and 7 females from Pismo Beach, San Luis Obispo Co., Calif., (UCB) have distinctly shorter wings than normal, measuring 1.4 × 0.55 (fig. 154a; compare with fig. 154). These specimens were taken on the beach and are similar in coloration and body size to normal winged specimens taken at the nearby Dune Lakes (UCB). Powell (1976) noted the development of brachyptery in species of several insect orders from the Santa Maria dune system, in which Pismo Beach lies. Geomorphological evidence suggests that this dune system was isolated for long periods during the Pleistocene. Selection pressures, perhaps strong onshore winds, may be responsible for the development of brachypterous forms associated with these dunes.

Remarks: The male holotype, allotype, and one paratype are from San Diego, Calif.

In certain respects, such as cerci with dorsoapical unguiform flattened seta, fused unmodified gonopods, separate epandrial lobes, and subrectangular hypandrium, the hypopygial structure of this species represents a generalized "ground plan," from which the hypopygium of the *apicalis, signaticornis,* and *veles* groups could have been derived.

11. *Medetera utahensis,* sp. nov. [CAS]

Male: Length 1.6.

Head: Vertex, frons, face, clypeus dark metallic green, covered with gray pruinosity; clypeus slightly shining.

Thorax: Dorsum and pleura dark metallic green, covered with gray pruinosity; 8 pairs short ac, less than width of ac band; 3 strong dc, decreasing anteriad; only median scutellars present, laterals absent; 3 pale ppls.

Legs: Coxae, femora brown; femoral "knees," remainder of legs yellow, distal tarsomeres darkened; I: 0.5; 0.55; 0.25/ 0.15/ 0.1/ 0.05/ 0.05; II: 0.6; 0.6; 0.35/ 0.2/ 0.1/ 0.075/ 0.05; III: 0.6; 0.65; 0.25/ 0.3/ 0.2/ 0.075/ 0.075; tibia III with strong anteroapical hooked spur.

Wings: 1.8 × 0.75; M gradually approaches R_{4+5}, becoming subparallel distally; wing ratio: 1:2.

Abdomen: Dark metallic green with thin dusting of gray pruinosity; setulae brownish; hypopygial capsule black; epandrium stout; epandrial seta midway between hypandrial hinge and epandrial lobes (fig. 45); epandrial lobes very short, together on digitiform protuberance that is separated from surstyli by deep groove; hypandrium with apical lobes as illustrated (fig. 46); surstyli with apical lobes bearing setae as illustrated; cerci ovate, with short, apical thornlike seta.

Female: Unknown.

Remarks: Known only from the male holotype, a somewhat greasy specimen. UTAH: Cache Co., W. Hodges Canyon, 28-31-viii-1973, leg, Harmston and Knowlton; (map 7); (from USUL, deposited in CAS).

12. *Medetera xerophila* Wheeler

Medetera xerophila Wheeler, 1899:28 [AMNH]
Medeterus obscuripennis Van Duzee, 1919:266, SYN. NOV. [ANSP]

Male: Length 2.2.

Head: Vertex, frons, face dark metallic green, covered with gray pruinosity; clypeus shining dark brown with green reflections.

Thorax: Dorsum, pleura dark brown with metallic green reflections and covered by gray pruinosity; brown vittae present over ac band to scutellum and laterally over dc; 7-8 pairs ac, as long as width of band; 3 strong dc, decreasing anteriorly, with some short setulae anteriormost; 2 strong median scutellars, with weak laterals, less than 1/4 length of medians; 2 pale ppls.

Legs: Coxae and femora dark brown; femoral "knees," tibiae, tarsi yellowish to infuscated; I: 0.6; 0.6; 0.25/ 0.15/ 0.1/ 0.1/ 0.1; II: 0.6; 0.7; 0.35/ 0.2/ 0.15/ 0.1/ 0.1; III: 0.8; 0.9; 0.25/ 0.3/ 0.15/ 0.1/ 0.1; tibia III with black hooked anteroapical spur.

Wings: 2.1 × 0.8; hyaline; M slightly arched toward R_{4+5}, becoming subparallel toward apex; wing ratio: 1:2.

Abdomen: Dark brown with green reflections; shining, with little pruinosity; hypopygial capsule flatened, dark brown; epandrium ovate in lateral view (fig. 47); epandrial seta short; median epandrial lobe on longer pedicel than lateral epandrial lobe; hypandrium with lateral sclerotized costae, median sector being more membranous (fig. 48); aedeagus elongate, tapering distally; surstyli fused basally and distinctly hinged on epandrium; dorsal surstylus digitiform, projecting well beyond ventral surstylus; cerci blunt, with some dorsal and apical setae.

Female: Lacks spur of tibia III; wings hyaline, no evidence of wing clouding.

Distribution: California: Monterey and Alameda Counties (map 5); type series is from Pacific Grove, 2-12-vii-1896, swept from dry ferns under pines (AMNH, USNM); other specimens from Arroyo Seco River, sw Greenfield, 5-v-1975, on *Salix;* Berkeley, iv-20-1908.

Remarks: I have designated a lectotype for *M. xerophila,* a male labeled "Monterey, Calif./ 2-7-96" (AMNH). *M. obscuripennis,* described by Van Duzee from a single female taken at Berkeley, is regarded as a junior synonym.

13. *Medetera falcata* Van Duzee

Medetera falcata Van Duzee, 1919:261 [CAS]
Medeterus longinquus Van Duzee, 1919:262, SYN. NOV. [CAS]

Male: Length 1.7-1.9.

Head: Vertex, frons, face metallic green, covered with dense gray pruinosity; clypeus shining black, with green reflections.

Thorax: Dorsum, pleura dark metallic green, covered with dense gray pruinosity; vittae not evident; 8-10 pairs ac, as long as width of ac band; 4 strong dc, decreasing anteriorly, with few setulae anteriormost; pair of strong median scutellars, laterals reduced to weak hairs; 2 pale ppls.

Legs: Coxae, femora dark brown; femoral knees, remainder of legs yellow, although distal tarsomeres darkened; I: 0.55; 0.55; 0.25/ 0.2/ 0.15/ 0.1/ 0.1; II: 0.6; 0.65; 0.4/ 0.2/ 0.1/ 0.1/ 0.1; III: 0.7; 0.75; 0.25/ 0.35/ 0.2/ 0.1/ 0.1; tibia III with strong, brownish bristle dorsally at 4/5, at least twice as long as adjacent setae; tibia III anteroapically with black hooked spur, subtended by smaller spur half its length.

Wings: 1.8 × 0.7; M gradually approaches R_{4+5}, becoming subparallel distally; wing ratio: 1:2.5.

Abdomen: Dark brown with thin dusting of gray pruinosity; setulae brownish; hypopygial capsule large, shining black, appearing stubby; epandrium rectangular in lateral view (fig. 49); epandrial seta halfway between epandrial lobes and hypandrial hinge; median epandrial lobes developed as hooklike structure without distal seta; lateral epandrial lobe with collarlike base; hypandrium parallel sided with pointed apical development (fig. 51); aedeagus elongate; surstyli short, with membranous attachment to epandrium; ventral surstylus triangular with thick, medianly directed seta; dorsal surstylus with various medianly directed setae as illustrated (fig. 50); cerci short, blunt.

Female: Lacks dorsal seta and apical spur of tibia III.

Distribution: California (map 7): Fresno, Sacramento, San Francisco, and east of Onyx, Kern Co.; 17 specimens examined; collection dates: v-vi.

Remarks: *M. longinquus* was described from a single female from Sacramento; in all respects it agrees with female paratypes of *M. falcata,* and I regard it as a synonym.

14. *Medetera aeneiventris* Van Duzee

Medeterus aeneus Van Duzee, 1919:263 (preocc. Meigen, 1838)
Medeterus obesus Van Duzee, 1919:264 (preocc. Kowarz, 1877) [CAS]
Medeterus univittatus Van Duzee, 1933b:151 (nom. sub-tit. for *obesus* Van Duzee), SYN. NOV.
Medetera aeneiventris Van Duzee, 1933b:152 (nom. substit. for *aeneus* Van Duzee) [CAS]
Medetera obsoletas Negrobov and Thuneberg, 1970: 14 (nom. substit. for *obesus* Van Duzee), SYN. NOV.

Male: Length 2.0-2.2.

Head: Vertex, frons metallic blue green with thin dusting of gray pruinosity; face and clypeus glabrous metallic blue green.

Thorax: Dorsum and pleura metallic blue green to bronze green with thin dusting of gray pruinosity; vittae absent; 10-12 pairs ac; 3-4 strong dc, decreasing anteriorly; few short setulae anteriormost; 2 strong median scutellars, laterals as weak hairs, less than 1/5 length of medians; 2-3 brownish ppls.

Legs: Coxae, femora dark brown; femoral "knees," tibiae, basal tarsomeres yellowish to infuscated; distal tarsomeres darkened; I: 0.7; 0.6; 0.25/ 0.2/ 0.1/ 0.1/ 0.075; II: 0.7; 0.7; 0.4/ 0.2/ 0.15/ 0.075/ 0.075; III: 0.65; 0.8; 0.25/ 0.35/ 0.2/ 0.1/ 0.1; tibia III anteroapically with short straight apical spur, not hooked.

Wings: 1.8 × 0.75; M arched toward R_{4+5}, becoming subparallel distally; wing ratio: 1:2.

Abdomen: Dark metallic green with short black setulae and only thin gray pruinose dusting; hypopygial capsule black, appendages brown; epandrium elongate, flattened, subrectangular in lateral view (fig. 52); epandrial seta hidden from lateral view, borne apically on blunt protuberance as seen in ventral view (fig. 53); epandrial lobes adjacent, borne on separate tubular bases; hypandrium parallel sided, with digitiform processes apically (fig. 53); aedeagus elongate; dorsal and ventral surstyli with distinct bases on epandrium, not fused; ventral surstylus broad, with strong bladelike seta ventrally, and distinctive globular process, bearing seta curved around its distal margin; dorsal surstylus elongate with setae as shown; cerci thick, elongate, curved, with blunt apex.

Female: Lacks apical spur tibia III.

Distribution: North America (map 7): Southern California, southern Arizona; eastern North America from southern Ontario to Florida; 26 specimens examined; collection dates: Florida, viii-xii; Ontario, viii-ix.

Intraspecific Variation: Color of seta and legs varies from yellowish to brown and is probably a function of age.

Remarks: Van Duzee described *M. aeneiventris* from a single male taken at Los Angeles. With its unmistakable hypopygium, this species clearly has a broad transcontinental distribution and undoubtedly will be recorded from other localities. *M. univittatus,* described from a single female from East Aurora, N.Y., is similar to *M. aeneiventris* females from an Ontario series and I regard it as a synonym.

15. *Medetera dorycondylus,* sp. nov. [CAS]

Male: Length 1.7-1.8.

Head: Vertex, face, frons bright metallic green, covered with gray pruinosity; clypeus with less pruinosity.

Thorax: Dorsum, upper pleura metallic green with bronze reflections and covered with dusting of gray pruinosity; pleura becoming dark brown ventrally; vittae not evident; 7-8 pairs ac, greater than width of ac band; 4 strong dc, decreasing anteriorly, with short setulae anteriormost; strong pair of median scutellars, laterals as weak hairs, less than 1/5 length of medians; 2 pale ppls.

Legs: Coxae, femora dark brown; femoral "knees," remainder of legs yellow to infuscated; distal tarsomeres darkened; I: 0.6; 0.55; 0.25/ 0.15/ 0.1/ 0.05/ 0.05; II: 0.7; 0.65; 0.35/ 0.2/ 0.1/ 0.075/ 0.075; III: 0.75; 0.8; 0.22/ 0.3/ 0.15/ 0.1/ 0.1; tibia III with anteroapical hooked spur, as long as width of basitarsus.

Wings: 1.75 × 0.75; hyaline; M gradually approaches R_{4+5}, becoming subparallel distally; wing ratio: 1:2.

Abdomen: Dark metallic green with faint dusting of gray pruinosity; setulae brownish; hypopygial capsule dark brown, appears "stubby"; epandrium ovate in lateral view, surstyli short (fig. 54); epandrial seta strong, on moundlike base; basal epandrial lobe with prominent moundlike base, its bristle as long stylus, subparallel to length of hypopygium and extending to tip of surstyli; laterodistal epandrial lobe on short collarlike base, its stylus about half as long; hypandrium long, widened medianly, with digitiform projections apically (fig. 56); aedeagus in ventral view widened at midlength (fig. 55); surstyli short, fused, bearing short setae as illustrated; cerci subtriangular, bearing strong apical seta.

Female: Lacks apical spur tibia III; wings hyaline.

Distribution: Western North America from British Columbia to northern California and east to Utah (map 3); holotype, male; allotype, female: CALIFORNIA: Mendocino Co., Inglenook Fen, 4 miles north of Fort Bragg, 29-v-1974, C. E. Griswold, coll. (UCB, deposited CAS); 59 male, 46 female paratypes: BRITISH COLUMBIA: Penticton; Qualicum; Keremeos; Esquimat, Vancouver Island; CALIFORNIA: Red Bluff; Fort Bragg; Inglenook Fen; Clam Beach; Smith River; OREGON: Sunset Bay, Coos Co.; UTAH: W. Hodges Canyon, Logan Creek, Tony Grove Canyon, all Cache Co.; WASHINGTON: Friday Harbor, Woodland, Klickitat River, Olga, Seattle, Coulton; Carlton; Asotin; (paratypes deposited UCB, WSU, AMNH, UCD, CNC, USNM); collection dates: California, v-vi; Washington, v-viii; Utah, vii-viii.

Biology: Most specimens taken in dry soil, xeric habitats, including grasslands and coastal prairies. Specific associations on *Corylus cornuta, Franseria,* and *Lathyrus torreyi* in Washington; *Ledum-Salix* grasslands, ferns, coastal prairies in Mendocino Co., Calif.

Remarks: The name "*dorycondylus,*" or "spear-mound," refers to the spearlike bristle on the elevated basal epandrial lobe.

The *aberrans* Group

The *aberrans* species group is defined by the following characters:

(1) Body bright metallic green blue, little obscured by pruinosity.
(2) Dorsocentral setae strong, prominent.
(3) Femur II and sometimes III in both sexes with 2-5 strong anterior setae, setae at least twice as long as short decumbent setae covering leg.
(4) Labellae of proboscis weakly sclerotized, not as massive as in other *Medetera* species.
(5) Male leg I with tarsomeres 2 and 3 flattened and modified in most species (apomorphy).
(6) Hypopygium cylindrical, elongate; distance HL > 2 (EH).
(7) Hypandrium and aedeagus not extending distally beyond position of ventral surstylus.
(8) Hypandrium elongate, subrectangular; aedeagus simple, tubular, without lateral appendages.
(9) Dorsal surstylar arm extended distally far beyond ventral arm and often expanded apically; ventral surstylus reduced to setal-bearing mound subtending dorsal surstylus (synapomorphy).
(10) Epandrial lobes with separate bases; located distally on epandrium near base of surstyli.
(11) Epandrial seta closer to epandrial lobes than to base of hypandrium.
(12) Cerci with elongate ventral projection, separated basally by furrow from more dorsal part (synapomorphy).
(13) Female terga 9 + 10 without apical projections (fig. 15).

The *aberrans* species group is readily recognizable by its bright metallic blue green and the usually ornamented male foretarsi. The group is predominately tropical and is known from the Oriental, Nearctic, and Neotropical Regions. *M. platychira** from Java and two undescribed species (BPBM) from the Philippines and Hong Kong are placed here. The two Nearctic species considered here represent northern extensions of a great Neotropical radiation. At least 27 of the 44 described Neotropical *Medetera* species belong to the *aberrans* group. The following species have at least tarsomere 3 of leg I expanded in males: *M. abrupta, M. albitarsis,** *M. amplimanus, M. archboldi,** *M. dilatata, M. excavata, M. flabellifera, M. flavides* Negrobov and Thuneberg (= *M. flavipes* Van Duzee, preocc. Meigen, 1824), *M. jamaicensis,** *M. minor, M. nigrimanus,** *M. occidentalis, M. ovata, M. pedestris,** *M. planipes,** *M. pollinosa,** *M. scaura,** *M. steyskali,** *M. tarsata, M. trititarsis,** and *M. varipes.** The male foretarsi are unmodified in *M. metallica, M. pallidicornis,** and *M. viridiventris* (= *M. currani**). The following species, described from females only, undoubtedly belong to the *aberrans* group as well: *M. bella,** *M. setosa,* and *M. spinulata.* From descriptions and examination of both determined and undetermined *Medetera* species, there seem to be no Afrotropical representatives of the *aberrans* group.

Little is known of the *aberrans* group biology. Although the two Nearctic species are frequently swept from wet grasslands, most of the Neotropical species appear associated with wet forests, although of unspecified habitat. In view of the group's bright metallic coloration and ornamented male foretarsi, a mode of dolichopodid courtship involving face-to-face encounters and male display may be indicated, in contrast to the male posterior mating approach of the more somber-colored *Medetera*.

The *aberrans* group is regarded as the sister group of *Thrypticus,* the other important medeterine genus. *Thrypticus* is characterized by having a lanceolate, sclerotized female ovipositor for laying the eggs of its stem-mining larvae inside grasses and reeds. The *aberrans* group and *Thrypticus* share distinct hypopygial similarities (see Phylogenetic Analysis). Both groups are closely associated with grassy, wetland habitats, more fully exploited by the derivative, stem-mining *Thrypticus*.

16. *Medetera aberrans* Wheeler

Medetera aberrans Wheeler, 1899:22 [AMNH]
Medeterus lobatus Van Duzee, 1914:441, syn. Robinson (1964a) [ANSP]
Medeterus flavicosta Van Duzee, 1932:11, SYN. NOV. [AMNH]

Male: Length 2.5-3.1.

Head: Vertex, frons, clypeus dark metallic green with slight dusting of gray pruinosity; antennae brown, 1st flagellomere subrectangular, arista apical; palpi dark brown; proboscis yellow brown, not massive or heavily sclerotized; occiput concave dorsally with single row of pale postorbitals and scattered pale setae on postcranium.

Thorax: Bright metallic green with bronze reflections and black setae; slight dusting of gray pruinosity on dorsum, denser on pleura; 5-6 pairs ac, longer than width of ac band; 3 strong dc: 2 bordering posterior slope, 1 sutural, and 5-6 short setulae anteriormost; 4 scutellars, laterals half as long as medians; 2 pale ppls.

Legs: Coxae brownish basally, pale distally; legs entirely yellow; coxal setae pale; I: 1.0; 0.9; 0.45/ 0.25/ 0.15/ 0.075/ 0.1; male foreleg with tarsomere 3 flattened, lobate, sometimes tarsomere 2 also flattened (figs. 115, 116); II: 1.0; 1.05; 0.55/ 0.25/ 0.2/ 0.1/ 0.1; tibia II with strong dorsal setae subapically and strong ventral apical seta, femur II lacking anterior setae; III: 1.0; 1.3;

0.3/ 0.55/ 0.35/ 0.15/ 0.1; femur III with strong anterior setae at 1/2, 1/3, tibia III with strong subapical dorsals.

Wings: 2.3 × 1.0; M arched toward R_{4+5}, 2 veins continue subparallel to apex; wing ratio: 1:1.4; lower calypter, halteres yellow.

Abdomen: Bright matallic green with short pale setulae; hypopygium brown with yellowish appendages; epandrium elongate, cylindrical (fig. 113); epandrial lobes separate, near base of surstyli; epandrial seta present; hypandrium (fig. 114), aedeagus elongate, simple; dorsal surstylus prolonged, distally expanded truncate apically; long plumose seta arises medianly and projects beyond apex; ventral surstylus reduced to basal projection on dorsal surstylus; cerci with elongate ventral projection, separated by furrow from more basodorsal part; cerci without modified apical seta.

Female: Similar to male but lacks flattened foretarsi.

Distribution: Eastern North America from southern Manitoba and southern Ontario to Gulf States; single females from Grant Co., Wash., and Jackson Co., Oreg., may belong to this species, indicating a western distribution (map 17); collection dates: iv (south), vi (north) to viii; 49 specimens examined.

Biology: Adults are frequently swept from wet grasslands or marshes. Along the Atlantic and Gulf coasts, *M. aberrans* has been taken from *Spartina* salt marshes.

Intraspecific Variation: Specimens from North Carolina and Georgia have scattered long, pale setae on both anterior and posterior surfaces of femur I; however, the setae are weak and easily may be knocked off specimens. Some males have a flattened and slightly excavated tarsomere 2 in addition to the usual lobate tarsomere 3 on the foreleg (figs. 115, 116). The plumose apical seta of the dorsal surstylus varies in length among specimens.

Remarks: Wheeler (1899) described *M. aberrans* from a single New Jersey female. Van Duzee (1914) described a male as *M. lobatus,* regarded as a synonym of *M. aberrans* by Robinson (1964a). I regard Van Duzee's (1932) *M. flavicosta,* based on a single female from Long Island, as another synonym of *M. aberrans.* It should be noted that the holotype of *M. flavicosta* clearly bears two pairs of scutellars, not one pair as described by Van Duzee.

In the northern part of its range, *M. aberrans* occurs sympatrically with *M. vockerothi.* The two species have been collected from the same locality, both in wet grasslands.

17. *Medetera vockerothi,* sp. nov. [CNC]

Male: Length 2.6-3.0.

Head: Vertex, frons, face dark metallic green with slight dusting of gray pruinosity; vertex slightly excavated beneath eye level; clypeus shining metallic green, laterally with some gray pruinosity; antennae dark brown, pedicel with apical ring of short setae; 1st flagellomere subrectangular, arista apical; palpi, proboscis dark shining brown; single row of pale postorbitals, with scattered long pale setae on postcranium.

Thorax: Bright metallic green with bronze reflections, faint dusting of gray pruinosity dorsally on thorax, denser on pleura; setae black; 8 pairs ac, longer than width of ac band; 4 strong dc: 2 subequals bordering mesoscutal depression; 1 sutural, 1 presutural, with 3-4 short setulae anteriormost; postpronotal subtended ventrally by shorter seta; 4 scutellars, laterals somewhat shorter than medians; 2 pale ppls, ventral of pair very long.

Legs: Coxae to distal femora dark metallic green; femoral "knees" and remainder of legs yellowish to infuscated; tarsi darkened; coxal setae pale; I: 0.95; 0.8; 0.45/ 0.2/ 0.1/ 0.1/ 0.1; male tarsi unornamented; II: 1.0; 0.95; 0.45/ 0.25/ 0.15/ 0.1/ 0.1; femur II with 3-4 anterior setae about midlength, tibia II with strong ventroapical; III: 1.1; 1.3; 0.35/ 0.45/ 0.3/ 0.15/ 0.15; femur II with 4-5 strong anterior setae at midlength; tibia III with strong preapical dorsals.

Wings: 2.4 × 1.0 (fig. 155); M arches anteriorly toward R_{4+5}; wing ratio: 1:1.4; lower calypter pale yellow with pale setae; halteres yellow.

Abdomen: Metallic green with short dark setulae; hypopygium held between hindcoxae at rest; capsule dark brown with brown appendages; epandrium elongate, cylindrical (figs. 117, 118); epandrial lobes adjacent but separate, borne on distal part of epandrium; epandrial seta present but arising medianly; hypandrium and aedeagus both elongate, simple, hypandrium forming inverted trough over aedeagus; distinct line of weakness between surstyli and epandrium; ventral surstylus reduced to seta-bearing lobe subtending blunt, elongate dorsal surstylus; dorsal surstylus bearing strong laterally and medianly projecting setae as illustrated; cerci blunt, prolonged ventrally, and separated from dorsobasal part by deep furrow.

Female: Similar to male; terga 9 + 10 without paired apical projections (fig. 15).

Distribution: Northern Nearctic; essentially boreal, extending at least as far south as Colorado in west and Ohio in east (map 17); holotype, male; allotype, female: QUEBEC: Beechgrove, 21-v-1964, J. R. Vockeroth, coll. [CNC]; 42 male, 35 female paratypes: ALBERTA: Grand Prairie; Grassy Lake; Kananaskis; BRITISH COLUMBIA:

Manning Prov. Park; near Terrace; Sawmill Lake; COLORADO: Nederland; MAINE: Penobscot Co.; MANITOBA: sw Shilo; MASSACHUSETTS: Framingham; MICHIGAN: Allegan Co.; MINNESOTA: Pine River; Rosemont; Ramsey Co.; NEW YORK: Hamilton Co.; Penn Yan; NORTHWEST TERRITORIES: Yellowknife, Stock Lake; OHIO: Champaign Co.; ONTARIO: Algonquin Park; Marmora; Moose Factory; Normandale; Maynooth; Pt. Ryerse; QUEBEC: Beechgrove; Gatineau Park; Misstassini; Fairy Lake Creek; VERMONT: Island Pond; (paratypes deposited in CNC, MSUE, NYSM, CUIC, UMSP, OSU, USNM, UGA, CAS); collection dates: 17-v to 30-vii.

Biology: Adults are often associated with wet grass or marshy vegetation. I have swept specimens from a marsh in Ontario, whereas records of montane specimens from Colorado and British Columbia cite grassy stream margins. A larval trombidioid mite was attached to the wing of a specimen from Algonquin Park, Ontario (CUIC-GCE 82-0623-1).

Remarks: In genitalic structure, *M. vockerothi* appears most closely related to *M. viridiventris** (= *M. currani* Van Duzee) from Panama. Both species lack ornamented male foretarsi.

The *signaticornis-pinicola* species group is a diverse assemblage, which in some respects would be easier to characterize if split into the component subgroups. However, some species display intermediate characters between the two, and I consider the assemblage as a whole is monophyletic. The following features are shared in common:

(1) Hypandrium broad, flat, not "clasping" aedeagus basally.
(2) Epandrial lobes with separate cylindrical bases, often positioned laterad of each other (synapomorphy).
(3) Epandrial seta always present.
(4) Hypopygium often "massive," as large as preabdomen.
(5) Dorsocentrals (dc) 6-10, decreasing gradually anteriorly, merging into field of setae extending laterally to postpronotum (fig. 4).
(6) Relatively large species, usually longer than 2.8 mm.
(7) Both lateral and median scutellars well developed.
(8) On leg III, tarsomere 1 less than twice length of tarsomere 2.
(9) Antennal scape and pedicel almost always yellow; scape often elongate.
(10) Female segment 9 + 10 with pair of apical projections (fig. 13).

The *signaticornis-pinicola* group is closely associated with the Holarctic circumboreal forests and contains the important predators of conifer-attacking Scolytidae. I have seen no representatives of this group from the Oriental, Australian, or Afrotropical Regions, and the only members of this group from the Neotropics are southern extensions of the widespread Nearctic *M. aldrichii* and *M. bistriata* in the montane pine forests of southern Mexico and Honduras, respectively.

The *signaticornis* subgroup is characterized by—

(1) Cerci tapering without apical processes.
(2) Aedeagus often tridentate (synapomorphy).
(3) Epandrium subtriangular in lateral view.
(4) Surstyli elongate.
(5) Antennal scape and pedicel always yellow.

The Holarctic *M. signaticornis* and the Nearctic *M. subsignaticornis, M. bistriata, M. flinflon,* and *M. aldrichii* are discussed here. Palearctic species that probably should be placed here include *M. bispinosa,** *M. collarti, M. complicata,** *M. dichrocera,** *M. fasciata,** *M. japonica, M. nitida, M. penicillata,** *M. setiventris,** *M. stackelbergiana,** *M. striata, M. sutshanica,** and *M. zinojevi.**

The *pinicola* subgroup is characterized by—

(1) Cerci large, often massive, appearing hemispheroidal in dorsal view, and often with apical processes.
(2) Aedeagus elongate, relatively simple.
(3) Epandrium subrectangular in lateral view, often appearing relatively small compared to enlarged apical part of hypopygium.
(4) Surstyli broad, massive, with elongate seta-bearing arms ventromedianly.
(5) Hypandrium broad, often asymmetrical, sometimes with irregular modifications (apomorphy).
(6) Pair of "bottle-brush"-shaped appendages arising internally from aedeagus (synapomorphy).
(7) Scape and pedicel usually yellow, sometimes entirely black.

The Holarctic *M. pinicola,* the Nearctic *M. vidua,* and the Palearctic *M. breviseta, M. fascinator,* M. flavirostris,** and *M. ravida** appear related. A grouping of derived species with bizarrely asymmetrical hypandria and correspondingly modified epandria includes the Nearctic *M. maura* and *M. gaspensis* and the Palearctic *M. fumida,* M. obscura,* M. occultans,** and *M. polonica.* The Palearctic *M. melancholia** and the Nearctic *M. neomelancholia* have similar genitalic structure and totally black antennae.

18. *Medetera signaticornis* Loew

Medetera signaticornis Loew, 1857:51 [ZMHB]
Medeterus viridifacies Van Duzee, 1923:248, SYN. NOV. [OSU]
Medeterus trisetosus Van Duzee, 1924:246, SYN. NOV. [CNC]
Medeterus vanduzeei Curran, 1928:203, SYN. NOV. [CNC]

Male: Length 2.9-3.5.

Head: Vertex, frons dark metallic green, covered with dense brown pruinosity; face, clypeus metallic blue green, with some pruinosity laterally and in band above frontoclypeal suture; scape and pedicel yellow; 1st flagellomere subrectangular, brown, bearing apical arista.

Thorax: Dorsum and pleura dark metallic green to black, covered with dense brown pruinosity; 10-12 pairs ac, increasing to width of ac band posteriorly; 6-8 pairs dc, decreasing anteriorly, and merging into field of short setulae extending to humeral callus; 3-4 dark ppls.

Legs: Coxae, legs entirely black; I: 1.0; 0.95; 0.45/ 0.35/ 0.25/ 0.15/ 0.15; II: 1.2; 1.15; 0.6/ 0.4/ 0.3/ 0.1/ 0.1; III: 1.2; 1.35; 0.35/ 0.6/ 0.3/ 0.15/ 0.15.

Wings: Length 2.9-3.1 × 1.25; M gradually arches toward R_{4+5} (fig. 156); wing ratio: 1:1; lower calypter pale yellow with distinct brown rim and pale setae; halteres yellowish to infuscated, lateral surface of club brownish.

Abdomen: Shining black with short black setulae; basal sections of terga with brown pruinose bands; hypopygium black with yellow-brown appendages; epandrium subtriangular in lateral view (fig. 57); epandrial seta present; epandrial lobes adjacent and slightly lateral of each other, their cylindrical bases slightly thickened; hypandrium becoming expanded apically and narrowing to blunt tip, with characteristic sigmoid indentations median from widest expansion (fig. 58); aedeagus sharply tridentate, lateral teeth typically short (fig. 59), although sometimes expanded (fig. 60); gonopods with setae as illustrated; cerci narrow, elongate, without modified distal processes.

Female: Similar to male.

Distribution: Holarctic, circumboreal: Europe through Siberia and Japan, Alaska, across Canada to Maritimes and northeastern U.S.A., south to northern U.S. Rockies (map 8); collection dates: Interior Alaska: 26-v to 30 vii; northeastern U.S.A.: 10-v to 15-vii; 421 Nearctic specimens examined.

Biology: In North America, *M. signaticornis* has been reared from the following tree-scolytid hosts:

Tree host	*Scolytid associate*	*Locality*
Picea glauca	*Dryocoetes affaber.*	Fairbanks, Alaska.
P. glauca	*D. affaber, Ips tridens, I. perturbans, Dendroctonus rufipennis.*	Kenai, Alaska.
P. mariana		Quebec; New Brunswick.
Picea sp.	*Dendroctonus rufipennis.*	Quebec.
Pinus banksiana		Do.
P. contorta	*Dendroctonus ponderosae.*	British Columbia.
P. strobus	*Pityogenes hopkinsi.*	Indiana.
P. strobus	*Ips pini*	Quebec.
P. sylvestris (introduced).	*Ips* sp.	Indiana.

M. signaticornis females were taken in great numbers on sticky traps placed on fallen *Picea glauca* in both interior and coastal Alaska sites and presumably were attracted for oviposition (Mark Whitmore, pers. commun.).

Intraspecific Variation: The lateral teeth of the aedeagus (ventral view) may appear somewhat expanded (fig. 60) and sometimes with extra irregular (single or paired), short subapical teeth. Such aedeagal modifications are found near the southern edge of the species range, especially in the Northeastern United States. Toward the center of its range, *M. signaticornis* displays a remarkable consistency in genitalic structure (aedeagus as in fig. 59), extending across the entire Holarctic Region. Specimens from Alaska tend to be somewhat larger than Nearctic specimens farther south.

Remarks: Loew described *M. signaticornis* from a single female, presumably from Germany, which I have examined. The genitalic illustrations in both Negrobov (1974) and this work should be regarded as typical of the male. The male holotypes of *M. viridifacies* from Alaska, *M. trisetosus* from Alberta, and *M. vanduzeei* from Quebec are clearly conspecific with *M. signaticornis* and are treated as junior synonyms.

19. *Medetera subsignaticornis*, sp. nov. [USNM]

Male: Length 2.8-2.9; wing: 2.9 × 1.1; head, thorax, legs, wings as in *M. signaticornis*.

Abdomen: Dark brown to black, covered with brown pruinosity; hypopygium black with brownish appendages (fig. 61); epandrial lobes adjacent and laterad of each other, with stout cylindrical bases; hypandrium broad with lateral costae in basal part, widened subapically and rounded apically (fig. 62); aedeagus wide, tridentate (fig. 63); gonopods shorter and wider than in *M. signaticornis;* cerci relatively thick, truncated ventroapically, without apical processes.

Female: Similar to male.

Distribution: New Hampshire (map 8); known from 4 specimens: Holotype male, allotype female, paratypes, 2 males: NEW HAMPSHIRE: Bethlehem, iv-29-1960, A. E. Avery, coll.; reared from under bark of balsam fir (*Abies balsamea*); from collection (UNH), all deposited (USNM).

Remarks: This species differs from *M. signaticornis* in its shorter, truncated cerci, wider surstyli, and wider hypandrium, lacking the sigmoid depressions. *M. subsignaticornis* probably originated as a White Mountain isolate of *M. signaticornis*.

20. *Medetera bistriata* Parent

Medetera bistriata Parent, 1929:183 [Halle, Germany]

Male: Length 2.6-3.0 (fig. 1, habitus).

Head: Vertex, frons metallic blue green, covered with dense gray pruinosity; face and clypeus dark satiny blue with fine granular texture; gray pruinose band above frontoclypeal suture; scape and pedicel yellow; 1st flagellomere brown, subrectangular; arista apical; palpi shining metallic blue black.

Thorax: Dorsum, pleura dark metallic blue green, covered with gray pruinosity; 3 distinct brown vittae, over ac band extending to scutellum, laterally over dc area; 10 pairs ac, shorter than width of band; 5-7 strong dc, decreasing in size anteriorly, with short setulae anteriormost; field of short setulae lies between anterior dc and postpronotum 4 strong scutellars, laterals 3/4 length of medians; 3-4 dark ppls.

Legs: Lower pleura, coxae, and legs red brown; I: 1.0; 0.95; 0.5/ 0.3/ 0.2/ 0.1/ 0.1; II: 1.1; 1.05; 0.7/ 0.4/ 0.25/ 0.1/ 0.1; III: 1.1; 1.2; 0.35/ 0.65/ 0.35/ 0.15/ 0.1.

Wings: 2.6 × 1.0; M straight, approaching wing apex without curving toward R_{4+5} (fig. 157); wing ratio: 1:1.25; lower calypter pale yellow with brown rim bearing pale setae; halteres yellow, club slightly infuscated.

Abdomen: Terga 1-5 with distinct banded appearance, anterior half of each tergum with lateral gray pruinose band, followed posteriorly by red-brown, nonpruinose band; hypopygium red brown, appendages yellow; epandrium subtriangular in lateral view (fig. 64); epandrial seta present; epandrial lobes adjacent and slightly laterad of each other, their bristles borne on somewhat elongated cylindrical bases; hypandrium elongate, symmetrical, with expanded subtriangular apex (fig. 65), and in lateral view showing more sclerotized, dorsally pointed projection; aedeagus tridentate, lateral "teeth" apically rounded (fig. 66); surstyli distinctly curved upward from long axis of hypopygium and bearing tiny denticles on ventrolateral surface; cerci elongate, blunt, without distinct apical processes.

Female: Similar to male.

Distribution: North America from Gulf Coastal Plain north into Canadian boreal forests, at least as far west as Northwest Territories; California Sierra Nevada; Mexico south to pine forests of Honduras (map 9); although widely distributed, this species is most abundant in pine forests of Atlantic and Gulf Coastal Plains; more than 2,000 specimens examined.

Collection Dates: Ontario, Quebec, Wisconsin: vi to vii; Gulf Coastal Plain: ii to x, although N. Bedwell (pers.

commun.) has observed active adults on warm winter days in Mississippi and suspects the species emerges throughout year. Moser et al. (1971) cited year-round collecting dates of *M. bistriata* in east Texas.

Biology: *M. bistriata* is the most important predator of the southern pine beetle, *Dendroctonus frontalis,* on the Gulf Coastal Plain, and it has been the object of considerable research. Females apparently are attracted to *D. frontalis*-infested trees by scolytid aggregation pheromones and have been found in a ratio to males of 25:1 on infested trees (Camors and Payne, 1973). Synthetic pheromones of *D. frontalis* were also found to attract *M. bistriata* (Williamson, 1971). *M. bistriata* may be more effective than insecticides in controlling southern pine beetle populations. Williamson and Vite (1971) found that the mortality of *M. bistriata* adults and other predators from spraying against *M. frontalis* may have been an important factor in the apparent increase of the bark beetle after such spraying programs.

M. bistriata has been reared from the following tree-scolytid hosts:

Tree host	*Scolytid associate*	*Locality*
Pinus banksiana	*Ips pini*	Laniel, Quebec.
P. banksiana		Ontario.
P. echinata	*Ips* sp.	Georgia.
P. echinata		Florida; North Carolina.
P. oocarpa		Honduras, Picacho Forest Station, Hopkins U.S.-52656.
P. ponderosa	*Ips confusus*	California, Blodgett Forest.
P. ponderosa		California, Hopkins U.S.-327805.
P. resinosa		Laniel, Quebec.
P. strobus	*Ips pini*	Do.
P. sylvestris (indroduced).	*Ips* sp.	Indiana.
P. taeda	*Dendroctonus frontalis.*	Texas; Louisiana; Arkansas; Mississippi; Alabama; North Carolina; Georgia.
Pinus sp.	*Ips calligraphus, I. avulsus.*	Arkansas.
Pinus sp.	*I. grandicollis*	North Carolina.

From these data, it can be concluded that *M. bistriata* is closely associated with the genus *Pinus*. I have seen no records of rearings from any other conifer or hardwood. In the Laniel, Quebec, series, for example, all 23 forestry cages from which *M. bistriata* had been reared contained pine logs, even though the project involved about 100 cages containing logs of various scolytid-infested conifers. This is especially significant since scolytid-associated *Medetera* species are usually associated with several tree species. Perhaps pine-derived terpene components of scolytid pheromones are the principal attractant to ovipositing *M. bistriata* (see Wood (1982)).

Remarks: The types of *M. bistriata* from Georgia are housed with the Röder Collection at the Martin Luther Universität, Halle, Germany. I was unable to examine these specimens. However, based on Parent's description and wing illustration, I am reasonably certain of its identity.

21. *Medetera flinflon*, sp. nov. [CNC]

Male: Length 2.6-2.8; a dark-brown species.

Head: Vertex, frons, face, clypeus dark brown with metallic green reflections, covered in brown pruinosity; face and clypeus bare medianly, separated by heavily pruinose frontoclypeal suture; pedicel and scape yellow, 1st flagellomere brown, subtriangular, with apical arista.

Thorax: Dorsum and pleura uniformly dark brown, covered in dense brown pruinosity; vittae not evident; 8-10 pairs ac, about as long as width of ac band; 5 strong dc, decreasing anteriorly into field of setulae, which extends laterally to postpronotum; 2 pairs strong scutellars, laterals about 2/3 length of medians; 3-4 dark ppls.

Legs: Coxae, legs entirely dark brown to black; I: 1.15; 1.0; 0.4/ 0.35/ 0.2/ 0.1./ 0.1; II: 1.25; 1.15; 0.65/ 0.4/ 0.25/ 0.15/ 0.15; III: 1.2; 1.35; 0.4/ 0.6/ 0.4/ 0.15/ 0.15.

Wings: 3.2-3.5 × 1.25; M approaches R_{4+5} as in *M. signaticornis* (q.v.); wing ratio: 1.2:1.0; lower calypter pale with dark-brown rim; halter mostly brown, with some yellow on basal half of club.

Abdomen: Dark brown with dusting of brown pruinosity; hypopygium dark brown with paler appendages; epandrium subtriangular in lateral view (fig. 67); epandrial lobes with elongate cylindrical bases, and positioned laterad of each other; epandrial seta on slight mound; hypandrium in lateral view with dorsobasal projection, either serrated or as sharp tooth (figs. 70, 71), in ventral view elongate, blunt, with subapical indentations (fig. 68); aedeagus elongate with subapical expansion which appears weakly sclerotized with irregular margins in ventral view (fig. 69); in lateral view, aedeagus bearing distinctive, internal footlike projec-

tion; surstyli separated apically by U-shaped gap, setae as illustrated; cerci wide apically, narrowing distally, without apical projections.

Female: Similar to male.

Distribution: Boreal western North America (map 9); holotype, male; allotype, female: MANITOBA: Flin Flon; emerged indoors from white spruce bark; 3-ii-1945; rec. 44 W 497, F. I. Survey 1945; paratypes 11: ALASKA: Bonanza Creek, 30 km sw Fairbanks, 26 to 30-v-1981; BRITISH COLUMBIA: Invermere, 17 to 22-v-1957; (all CNC).

Biology: The following rearing records are associated with *M. flinflon:*

Tree host	*Scolytid associate*	*Locality*
Picea glauca		Manitoba.
P. glauca	*Dryocoetes affaber.*	Alaska.
P. glauca	*Dendroctonus ponderosae.*	British Columbia.

Intraspecific Variation: The dorsal projection of the hypandrium is serrate in the British Columbia specimens (fig. 71), but it is a single sharp projection in the Manitoba and Alaska specimens (fig. 70). In all other respects, the hypopygia are similar among the specimens. The Palearctic *M. dichrocera** displays certain similarities in hypopygial structure to *M. flinflon.*

22. *Medetera aldrichii* Wheeler

Medetera aldrichii Wheeler, 1899:24 [AMNH]
Medeterus oregonensis Van Duzee, 1919:268, SYN. NOV. [USNM]

Male: Length 3.5-4.8.

Head: Vertex, frons black with greenish reflections, covered with gray-brown pruinosity; face, clypeus shining metallic blue violet, with fine coriaceous texture; pedicel and scape yellow, 1st flagellomere brown, broadly subtriangular; arista apical.

Thorax: Brown black, covered with dense gray pruinosity dorsally; setae black; 3 distinct brown vittae, over ac band across mesoscutal depression to base of scutellum, and laterally over dc, extending anterolaterally toward humeral area; 10-12 pairs ac, about as long as width of ac band; 6-7 strong dc, decreasing gradually anteriorly and merging into field of setulae; short seta on notopleural suture; 4 strong scutellars, laterals 3/4 length of medians; 4-5 dark ppls.

Legs: Coxae, legs black; I: 1.7; 1.5; 0.75/ 0.5/ 0.3/ 0.2/ 0.15; II: 1.6; 1.65; 0.9/ 0.65/ 0.4/ 0.2/ 0.15; III: 1.7; 2.0; 0.6/ 1.0/ 0.5/ 0.2/ 0.15; male tibia III without strong dorsoapical bristles.

Wings: 3.6-4.2 × 1.5-1.7; M gradually arches toward R_{4+5}; wing ratio: 2:1 to 1:1 (locally variable); lower calypters yellow with brown rim and long pale setae; halteres yellow to infuscated.

Abdomen: Shining dark brown to black with dusting of gray pruinosity on basal half of terga; hypopygium dark brown, appendages yellowish; epandrium subrectangular (fig. 72); epandrial lobes with cylindrical bases, adjacent and slightly laterad of each other; hypandrium slightly expanded apically, and in ventral view with tiny spicules arranged along lateral margin before blunt apex (fig. 73); in lateral view, sharp dorsal projections arise subapically; aedeagus elongate, tridentate, with curved lateral teeth (fig. 74); pair of elongate, apically brushlike projections arise internally from aedeagus; surstyli slightly upcurved, distally with median lobe between dorsal and ventral lobes; cerci broad, cleft apically, dorsal arm bearing distinctive spatulate seta.

Female: Similar to male.

Distribution: Montane western North America: From Mexican States of Colima and Mexico north through the Rockies, Black Hills, Sierra Nevada, and Coast Ranges to coastal Alaska (no specimens seen from interior Alaska or Yukon) (map 10); collection dates: Mexico: iii; ix; Idaho: v-viii; Alaska: v-vii; 723 specimens examined.

Biology: The *M. aldrichii* rearing data are as follows:

Tree host	*Scolytid associate*	*Locality (Hopkins No.)*
Abies concolor	Scolytid galleries	Idaho.
A. grandis	*Pseudohylesinus grandis.*	Idaho; Washington (4033b).
A. lasiocarpa		Washington; Oregon.
A. procera		Washington.
Alnus rubra	(Ovipositing female).	Do.
Alnus sp.		Oregon (80b); Idaho (39661-D).
Chamaecyparis nootkatensis.		Washington.
Picea engelmannii		Washington; British Columbia.

P. engelmannii		Colorado (36628-A, 31408-C-6, 36626-X-5, 31409-A-18).
P. glauca	*Dryocoetes affaber.*	Kenai, Alaska.
P. sitchensis		Oregon; Washington (4006, 20519-K, 2176 i, j).
Pinus contorta		California (33944-B); Colorado; British Columbia; Oregon.
P. contorta	*Orthotomicus caelatus.*	Washington.
P. contorta	*D. ponderosae*	Utah; Idaho; British Columbia.
P. flexilis		Colorado (31507, 31501-K, 31526).
P. montezumae		Harinas, Mexico.
P. monticola		Idaho.
P. ponderosa	*D. ponderosae*	Montana (51895, 51927); Colorado (17703-A-3); British Columbia; Oregon (14264f); Arizona; New Mexico; South Dakota.
P. ponderosa	*D. frontalis, D. brevicomis.*	Arizona.
P. radiata		California.
Pseudotsuga menziesii.	*Trypodendron* sp., *Gnathotrichus* sp.,*Dryocoetes autographus, Pseudohylesinus nebulosus, Dendroctonus pseudotsugae.*	Washington.
P. menziesii		Colorado; Idaho; Utah.
Quercus sp.		California.
Tsuga heterophylla.	*Pseudohylesinus granulatus, P. sericeus.*	Washington.
T. heterophylla		Washington (2003f).
Umbellularia californica.		California.

As evidenced by these data, *M. aldrichii* has been reared from a variety of tree species, both hardwood and conifer, and in association with several bark beetle genera. However, this species is most strongly associated with *Dendroctonus,* and it is a major predator of that genus throughout the coniferous forests of western North America.

An extensive literature is associated with *M. aldrichii* on such topics as life histories, population densities, behavior, and larval stages (see DeLeon (1935), Fitzgerald and Nagel (1970, 1972), Hopping (1947), Johnsey et al. (1965), McGherkey and Nagel (1966), Nagel and Fitzgerald (1975), and Schmid (1970-71)). The life history is summarized as follows: *M. aldrichii* females oviposit near or in gallery entrances on scolytid-infested trees. Larvae work their way through the galleries, feeding on scolytid grubs. Mature larvae overwinter near gallery openings and pupate there the following spring. Adults emerge in late spring and early summer prior to the emergence of their scolytid hosts. *M. aldrichii* is univoltine in the northern part of its range.

Intraspecific Variation: Specimens taken from the wet coastal forests of the Pacific Northwest appear darker, with less distinct vittae than those from the drier, ponderosa pine forests of the Rocky Mountains. The m-cu/distal CuA "wing ratio" can vary locally from 1.0 to 2.0.

Remarks: Wheeler (1899) described *M. aldrichii* from a single male taken at Moscow, Idaho. The male holotype of *M. oregonensis* from Ashland, Oreg., is clearly conspecific with *M. aldrichii;* the genitalia are identical. The type of *M. oregonensis* has been mislabeled *"Dolichopus oregonensis"* in the USNM collection.

M. aldrichii displays features intermediate between the *signaticornis* and *pinicola* species subgroups. With the *signaticornis* subgroup, it has a tridentate aedeagus, a subapically indented hypandrium, and a similar epandrial form, whereas it shares the internal "bottle-brush" aedeagal projections with members of the *pinicola* group.

23. *Medetera pinicola* Kowarz

Medetera pinicola Kowarz, 1877:61 [UMO]

Male: Length 2.8-3.2.

Head: Vertex, frons metallic green, covered with gray pruinosity; face, clypeus shining coriaceous metallic blue green, with pruinosity laterally; scape and pedicel yellow; 1st flagellomere brown, pubescent, subrectangular; arista apical; palpi, proboscis dark shining brown; postorbitals in single row, dark, short dorsally,

long, pale laterally and ventrally; scattered pale setae on postcranium.

Thorax: Dorsum, pleura metallic blue green, covered with gray-brown pruinosity; vittae not evident; 12-14 pairs ac, increasing posteriorly, posteriormost are 1½ times as long as width of ac band; 10-12 pairs dc, decreasing anteriorly, and merging into field of dark setulae between dc and humeral callus; 3-4 brownish ppls; 4 scutellars, laterals 3/4 length of medians.

Legs: Coxae and legs black; femoral "knees" paler; I: 0.95; 0.8; 0.45/ 0.3/ 0.4/ 0.1/ 0.1; II: 1.0; 0.95; 0.6/ 0.3/ 0.2/ 0.1/ 0.1; III: 1.0; 1.25; 0.3/ 0.6/ 0.3/ 0.15/ 0.1.

Wings: 2.8 × 1.0; M curves sharply up to R_{4+5} and they continue subparallel in distal 1/4 of wing (fig. 158); wing ratio: 1:1.2; lower calypter entirely pale yellow, without dark rim; halteres pale yellow.

Abdomen: Black with metallic green reflections and covered with dark setulae; hypopygium massive, wide; epandrium subrectangular (fig. 75); distance from epandrial lobes to base of hypandrium greater than distance from base of hypandrium to basal edge of epandrium; epandrial lobes with massive cylindrical bases, positioned laterally; hypandrium broad, expanded subapically (fig. 76), with asymmetric right basal expansion (shown as stippling in figure), and weak internal projection on left apical side; aedeagus relatively simple, tapering distad, with internal elongate "bottle-brush"-like projections; gonopods massive; ventral gonopod with medial, apically setigerous arm; ventral surstylus broad, with strong hooklike setae and other setae as shown; dorsal surstylus apically expanded with setae as shown; surstyli have external longitudinal cuticular striae; cerci massive, appearing as hemispheroids in dorsal view, tapering distally with apical "can-opener"-shaped hook.

Female: As in male, but usually larger; body length: 3.1-3.3; wing length: 3.3 × 1.3.

Distribution: Holarctic, Europe west of Urals; North America, Rocky Mountains south to Arizona, northern Coast Ranges, boreal Canada, from Ungava south along Atlantic Coastal Plain and Appalachians to Georgia (map 11); 74 specimens examined; collection dates: Georgia, ii-vi; Quebec, vi-vii; Wshington, v.

Biology: *M. pinicola* has been reared from a variety of tree and scolytid hosts as follows:

Tree host	*Scolytid associate*	*Locality*
Picea engelmannii		British Columbia.
Pinus banksiana		Laniel, Quebec.
P. echinata		Georgia.
P. resinosa		Laniel, Quebec; Maine.
P. strobus		Laniel, Quebec.
P. taeda	*Dendroctonus frontalis.*	Georgia.
Pseudotsuga menziesii.	*D. pseudotsugae, Orthotomicus caelatus, Dryocoetes autographus.*	Washington.
P. menziesii		Idaho, Hopkins U.S. 41489, 4168cc, 35317.
P. menziesii	*Dendroctonus ponderosae.*	British Columbia.
P. menziesii	*Ips pilifrons utahensis, Dendroctonus rufipennis.*	Alpine, Ariz. (2760 m).

Remarks: I have designated a lectotype of *M. pinicola,* a male from Austria, labeled "Ramsau/7.6.66" in the Kowarz Collection, Oxford University. Although this species has not been recorded east of the Urals, I would not be surprised if it occurred there and made the species circumboreal. Parent (1938) described the species as present in north and central Europe and "Amerique du Nord." Although there are no previous North American identifications or literature references to *M. pinicola,* he may well have seen Nearctic specimens of this species.

It is interesting that European rearings of this species had been considered for release as an exotic biological control agent against *Dendroctonus ponderosae* in the Black Hills, S. Dak., (J. M. Schmid, pers. commun.; identification of voucher specimens in USNM). Although *M. pinicola* has not been recorded from the Black Hills, it was already widely distributed as native in North America, often in association with *Dendroctonus* spp. It was never released.

M. pinicola may represent an ancestral stock from which *Medetera* with highly modified hypandria, such as in *M. maura* (q.v.) and the Palearctic *M. obscura,** could have arisen. The slight asymmetry of the *M. pinicola* hypandrium could be the starting point for the development of grossly asymmetrical hypandria of derivative species.

24. *Medetera maura* Wheeler

Medetera maura Wheeler, 1899:23 [AMNH]

Male: Length 3.5-4.5.

Head: Vertex, frons, face black with metallic green reflections, covered with thin dusting of gray pruinosity;

clypeus coriaceous shining blue black, with violet reflections and some lateral pruinosity; otherwise as in *M. pinicola.*

Thorax: Entirely metallic black with dusting of gray pruinosity on dorsum and upper pleura; faint brown vittae over ac band and laterally over dc; otherwise as in *M. pinicola.*

Legs: Coxae and legs black, femoral "knees" paler; I: 1.2; 1.1; 0.55/ 0.3/ 0.25/ 0.2/ 0.15; II: 1.3; 1.2; 0.7/ 0.4/ 0.25/ 0.2/ 0.15; III: 1.3; 1.5; 0.4/ 0.65/ 0.4/ 0.25/ 0.15; tibia III with group of pale setae dorsoapically.

Wings: 3.0 × 1.4 to 3.8 × 1.6; M upcurved to R_{4+5}, subparallel distally (also see under Intraspecific Variation); wing ratio: 1:1.8; alula pale yellow with pale rim bearing long pale setae; halteres pale yellow.

Abdomen: Shining black with short black setulae; hypopygium black with brown appendages; hypopygium massive, larger than preabdomen; epandrium of irregular shape laterally as shown, partially to accommodate highly modified hypandrium (fig. 77); epandrial lobes on elongate tubular bases, laterad of each other; epandrial seta long; hypandrium bizarrely modified; in lateral view, internal differentially sclerotized hook or "pseudoaedeagus" is apparent, with pair of pubescent filaments arising near upward curvature; in ventral view (fig. 78) "pseudoaedeagus" is deflected to left, is basally forked, with 2 arms arising as basal costae; "pseudoaedeagus" bears microtrichia as shown; hypandrial outline appears irregular as shown, and dorsobasally bears microtrichia; aedeagus elongate, simple, narrowing distally, in ventral view (fig. 78) curved right, to accommodate "pseudoaedeagus" developed on left side of hypandrium; elongate "bottle-brush" appendages arise internally from aedeagus; surstyli divided by deep groove; ventral surstylus with large hooklike seta mesad, other setae as shown; cerci tapering distad, with apical "can-opener"-like projection and large tooth midventrally.

Female: Lacks dorsoapical setae on tibia III.

Distribution: Boreal North America exclusive of western montane region (map 12); from 4 localities: Fairbanks, Alaska (6-vii); Mackenzie Delta, Northwest Territories (13-vii); Laniel, Quebec (vi-vii); Mt. Washington, N.H. (no date); 81 specimens examined.

Biology: The following rearing records are associated with specimens of *M. maura:*

Tree host	*Scolytid associate*	*Locality*
Picea glauca -----	*Dryocoetes affaber.*	Alaska.
Picea sp. --------	----------	Quebec.
Pinus banksiana --	----------	Do.
P. resinosa -------	----------	Do.

Overgaard (1968) cited the rearing of *M. maura* from southern pine beetle-infested bolts in Texas and Louisiana. These specimens had been incorrectly identified and are in fact *M. bistriata.*

Intraspecific Variation: The Mt. Washington type series is somewhat larger (4.2-4.5) than the Quebec and Northwest Territories specimens (3.5-3.6). Also, some of the Mt. Washington specimens display an almost straight M, approaching R_{4+5} as in *M. bistriata,* whereas others in the series have a more concave M as in *M. signaticornis.* All Canadian and Alaskan specimens show a more strongly concave M, rapidly approaching R_{4+5} as in *M. pinicola.* As well, the first flagellomere of the Mt. Washington series is subrectangular, whereas the others are definitely subtriangular. Despite these somatic variations, the distinctive hypopygium, with its bizarrely modified hypandrium, maintains a constant form throughout the range.

Remarks: *M. maura* was described from a syntype series of two males and two females from Mt. Washington, N.H. (AMNH). I have designated a male as lectotype, bearing the label "Mt. Washington."

This species is probably derived from an ancestral species close to *M. pinicola.* In *M. maura,* the hypandrium has been highly modified and the gonopodal setae have been reduced. The two species have been reared together from the same scolytid-infested logs at Laniel, Quebec.

25. *Medetera gaspensis,* sp. nov. [CNC]

Male: Length 3.5-3.6. This species is identical to *M. maura* in all respects except the hypandrial and aedeagal structure described here. Hypandrium grossly modified, with pointed, sclerotized structures projecting beyond ventral margin (fig. 80); in ventral view, basally sclerotized costae are each produced to form projecting structures, with shorter toothlike structure subapically on right side (fig. 79); in lateral view, aedeagus is expanded somewhat apicad, with apicoventral projection (fig. 81).

Female: Similar to male.

Distribution: Gaspé Peninsula, Quebec (map 12); holotype, male; allotype, female; paratypes, 15 males, 18 females: QUEBEC: Gaspé Co., 20-vi-1935, E. B. Watson, coll.; reared from spruce (*Picea* sp.) infested with *Dendroctonus piceaperda;* (CNC).

Remarks: *M. gaspensis* appears closely related to *M. maura* and probably evolved in isolation on the Gaspé Peninsula. The hypandrial structure is distinctive and found in all males from this series.

26. *Medetera vidua* Wheeler

Medetera vidua Wheeler, 1899:24 [AMNH]
Medeterus emarginatus Van Duzee, 1914:439, SYN. NOV. [CAS]

Male: Length 4.2-4.7.

Head: Vertex, frons black, covered in brown-gray pruinosity; face, clypeus shining black with fine coriaceous texture; pruinosity along sides of clypeus and in band above suture; scape yellow; pedicel basally yellow, distally brown; 1st flagellomere brown, subtriangular, arista apical.

Thorax: Dorsum, pleura black, covered with gray pruinosity; brown pruinose vittae over ac band and laterally over dc; 14-16 pairs ac, approximately width of ac band; 5-6 strong dc, decreasing gradually anteriorly, and merging into field of dark setulae which extends laterally to postpronotum; 1 hm, and additional seta below on notopleural suture; 4 scutellars, laterals 3/4 length of medians; 4-6 dark ppls.

Legs: Coxae, legs black; femoral "knees" yellowish; I: 1.6; 1.4; 0.7/ 0.4/ 0.25/ 0.15/ 0.15; II: 1.65; 1.6; 1.0/ 0.6/ 0.4/ 0.2/ 0.15; III: 1.7; 2.0; 0.6/ 0.95/ 0.5/ 0.2/ 0.15; tibia III with distinct cluster of strong, pale bristles in dorsoapical third.

Wings: Length 4.3-4.8 × 1.4-1.6; elongate; M approaches R_{4+5} in gentle arch as in *M. signaticornis;* wing ratio: 1:1; lower calypter pale with distinct brown rim and long pale bordering setae; stem of halter infuscated, club yellow.

Abdomen: Black with dusting of gray pruinosity, especially on basal half of terga; S 8 (covering hypopygial foramen) with cluster of strong dark setae; hypopygium dark brown with yellowish appendages; epandrium elongate, subrectangular in lateral view (fig. 82); epandrial lobes with adjacent cylindrical bases; distad to epandrial lobes and arising out of median lateral walls of epandrium is rectangular prominence with basally jagged ridge of teeth, subtended mesad by elongate, apically "bottle-brush"-like filament; hypandrium elongate, parallel sided, symmetrical, with distal pubescent filaments as illustrated (fig. 83); aedeagus tapering distally (fig. 84), often with scattered subapical setae visible in lateral view; surstyli with longitudinal cuticular striations; ventral surstylus expanded into apical spatula, subtended mesad and ventrad by 2 elongate arms, each bearing apical seta; dorsal surstylus with short, thin ventral arm; cerci in dorsal view appear as dark swollen hemispheroids; cerci with apical projection as shown and large ventral tooth at midlength.

Female: Usually larger than male and lacks row of strong, pale bristles on tibia III.

Distribution: Moist coniferous forests of northern Nearctic: Alaska, Yukon, Rockies and Coast Ranges south to Idaho and Oregon, across taiga to Labrador, Maritimes, and northeastern U.S.A. (map 13); 72 specimens examined; collection dates: v-viii.

Biology: The rearing data are summarized as follows:

Tree host	*Scolytid associate*	*Locality*
Picea sitchensis	*Ips perturbansa, Pissodes fasciatus.*	Washington.
Pinus ponderosa	----------	Idaho (Hopkins U.S.-20019).
Pseudotsuga menziesii.	*Hylastes nigrinus.*	Oregon.
P. menziesii	----------	Washington.

Remarks: *M. vidua* was described by Wheeler (1899) from a single male taken at Olympia, Wash. *M. emarginatus,* described from a single female taken at Kearney, Ontario, is regarded as a junior synonym.

27. *Medetera neomelancholia,* sp. nov. [CNC]

Male: Length 2.9.

Head: Vertex, frons dark brown with greenish reflections, covered with dense gray pruinosity; face and clypeus shining black with metallic green reflections, and with gray pruinosity laterally and above frontoclypeal suture; antennae entirely brown black, not yellow; 1st flagellomere subtriangular, arista apical.

Thorax: Dorsum, pleura dark brown to black with green metallic reflections, and covered with gray pruinosity; faint brown vittae over ac band and laterally over dc; 8-10 pairs ac, becoming longer than width of ac band posteriorly; 5 strong dc, decreasing gradually anteriorly into field of setulae; lateral scutellars 2/3 length of medians; 3-4 infuscated ppls.

Legs: Coxae, femora dark brown to black; tibia, tarsi infuscated yellow to brown; I: 0.9; 0.8; 0.4/ 0.25/ 0.2/ 0.1/ 0.1; II: 1.0; 1.05; 0.55/ 0.3/ 0.2/ 0.1/ 0.1; III: 1.05; 1.3; 0.3/ 0.5/ 0.3/ 0.15/ 0.1.

Wings: 2.5 × 1.1; M arches gradually up to R_{4+5} as in *M. aldrichii,* not abruptly as in *M. pinicola;* wing ratio: 1.2; lower calypter pale with brown rim bearing pale setae; halteres yellow.

Abdomen: Dark brown to black with metallic green reflections, covered with gray pruinosity; hypopygium black with brownish appendages; epandrium roughly rectangular (fig. 85); epandrial lobes with stout cylindri-

cal bases, positioned laterad of each other; epandrial seta halfway between epandrial lobes and base of hypandrium; hypandrium symmetrical; widened slightly subapically, and with parallel lateral costae (fig. 86) which appear as upturned hooklike structures in lateral view; aedeagus simple, tapering, and internally bearing pair of elongate "bottle-brush"-like appendages; surstyli broad, fused almost to apex; ventral surstylus subtended medianly by elongate arm bearing apical seta; ventral surstylus with stout curved seta subapically and short, seta-bearing protuberance dorsally; dorsal surstylus curved with setae as illustrated; cerci hemispheroidal in dorsal view, without apical processes.

Female: Similar to male, but slightly larger: 3.0-3.1.

Distribution: Ontario (map 12); holotype, male; allotype, female; paratypes, 3 females: ONTARIO: Kirkwood Twp, Algoma District, vii-11-1961; reared from crown of *Pinus resinosa;* (all CNC).

Remarks: *M. neomelancholia* is closely related to the western Palearctic *M. melancholia,** originally described by Lundbeck (1912) from a syntype pair taken in Denmark (ZMUC). I have designated the male, bearing the label "Hareskov, 18.4.1909/Kryger" as lectotype. *M. neomelancholia* differs from *M. melancholia* in its narrower hypandrium with sclerotized costae and in the lack of a distally expanded aedeagus. However, in general hypopygial structure and totally black antennae, they show strong similarity. Both species clearly belong to the *pinicola* species subgroup.

The *apicalis* species group is somewhat difficult to define, since it has few strong synapomorphies. The following features are shared in common:

(1) Hypopygium elongate, subrectangular in lateral view; HL usually twice EH.
(2) Epandrial lobes distinctly separate, with short collarlike bases.
(3) Hypandrium often forming elongate, inverted "trough" over aedeagus.
(4) Aedeagus, as it emerges from epandrium, is "clasped" by base of hypandrium (synapomorphy).
(5) Hypandrium often held out at angle from epandrium (e.g., fig. 87).
(6) Epandrial seta well developed.
(7) Aedeagus long, tapering.
(8) Cerci usually with flattened, apicodorsal unguiform setae.
(9) Surstyli fused almost to tip and somewhat expanded apically.
(10) Surstyli sometimes bearing distinctive curved, frayed seta on ventral surface (apomorphy).
(11) Female terga 9 + 10 with pair of apical projections (fig. 14).

The following species are closely related to the Holarctic *M. apicalis,* having the distinctive ventral frayed seta on the surstyli and similar apical projections on the cerci: The Nearctic *M. saguaroicola,* the Palearctic *M. abstrusa,** *M. baicalica,** *M. betulae,** *M. borealis,** *M. femina,** *M. fissa,** *M. glauca,** *M. impigra,** *M. pallipes,** *M. palmaris,** *M. pseudoapicalis,** *M. taurica, M. tristis,** *M. seguyi,* and *M. subtristis.** (A number of these Palearctic species are probably synonyms of *M. apicalis.*)

A Palearctic subgroup with distally expanded, clublike surstyli and the cerci with a cluster of strong ventroapical bristles includes *M. belgica,** *M. bisecta,** *M. curviloba,** *M. cuspidata,** *M. gracilicauda, M. hissarica, M. incisa,** *M. kowarzi,** *M. leucarista,** *M. morgei, M. pelaria,** and *M. zaitzevi.**

A subgroup with dark coloration and similar cercal structure includes the Nearctic *M. pseudosibirica* and the Palearctic *M. sibirica.**

A Palearctic subgroup with the epandrial lobes on a distinct angular prominence includes *M. acanthura,** *M. parenti,* and *M. relicta.*

The Palearctic *M. tumidula** from the Caucasus has the basal half of CuA thickened in the male. The hypopygium is very close to that of *M. apicalis,* but not to that of the *crassivenis* group.

Other species associated with the *apicalis* group include the Nearctic *M. cyanogaster, M. longinervis,* and *M. furcata* and the Palearctic *M. delita** and *M. takagii.*

The *apicalis* group members have been reared from a variety of hosts under the bark of trees in association with scolytid and dipterous larvae, bracket fungi, and rotting cactus. The group is widespread in the Holarctic Region and also found in the Oriental Region.

28. *Medetera apicalis* (Zetterstedt)

Medetera apicalis (Zetterstedt), 1843:452 (as *Hydrophorus*) [LUND]
Medeterus aurivittatus Wheeler, 1899:29, SYN. NOV. [AMNH]
Medeterus caerulescens Malloch, 1919:8, SYN. NOV. [INHS]
Medeterus frontalis Van Duzee, 1919:265, SYN. NOV. [CAS]
Medeterus distinctus Van Duzee, 1919:266, syn. of *M. caerulescens* by Robinson, 1964a [CAS]
Medeterus bicolor Van Duzee, 1923:249 (*bicolor* preocc. Meigen, 1838) [OSU]
Medeterus parvus Van Duzee, 1923:249, SYN. NOV. [OSU]
Medeterus ciliatus Van Duzee, 1928b:37, SYN. NOV. [CAS]
Medeterus venatus Curran, 1928:201, SYN. NOV. [NYSM]
Medeterus simplicipes Curran, 1928:202, SYN. NOV. [NYSM]
Medetera orbiculata Van Duzee, 1932:12, SYN. NOV. [AMNH]
Medetera albiciliata Van Duzee, 1933a: 13, SYN. NOV. [AMNH?]
Medetera arctica Van Duzee, 1933b:152 (nom. substit. for *bicolor* Van Duzee, 1923), SYN. NOV.

Male: Length 2.3-3.2.

Head: Vertex, frons, face dark metallic green, covered with dense gray pruinosity; clypeus coriaceous, shining dark green, with some pruinosity laterally; antennae usually brown, but sometimes with scape and pedicel yellow (see below); palpi and proboscis shining dark brown; single row of pale postorbitals with scattered pale setae on postcranium.

Thorax: Dorsum and pleura dark metallic green, covered with gray pruinosity; bronze vittae evident over ac band and laterally over dc area (these vittae often as distinct bands, especially in Rocky Mountains, less distinct to obscured in eastern North America); 9-11 pairs ac, increasing posteriorly, such that posteriormost ac are wider than ac band; 4 strong dc, decreasing somewhat anteriorly, with short setulae anteriormost (fig. 5); field of short setulae extending laterally to postpronotum; lateral scutellars about half as long as median pair; 2-3 pale ppls.

Legs: Coxae, femora brown to black; femoral "knees" pale; tibiae and tarsi yellowish brown to black; I: 0.9; 0.8; 0.4/ 0.2/ 0.15/ 0.1/ 0.1; II: 1.0; 1.05; 0.5/ 0.25/ 0.2/ 0.1/ 0.1; male femur II with pale weak setae along ventral margin, easily knocked off; III: 1.05; 1.3; 0.3/ 0.45/ 0.25/ 0.1/ 0.1.

Wings: 2.1-2.9 × 0.8-1.5; M upcurved toward R_{4+5} (fig. 159); wing ratio varies from 1:1.5 to 1:2; lower calypters and halteres pale, although lower calypters sometimes with brown rim in dark specimens.

Abdomen: Dark metallic green with gray-brown pruinosity; genital capsule black, appendages brown; in dried specimens, hypandrium often held at 45°-80° angle away from hypopygium, its base distinctly "clasping" aedeagus; epandrium subrectangular in lateral view (fig. 87); bristles of epandrial lobes with short, separate collarlike bases; epandrial seta well developed; hypandrium elongate, forming inverted trough over aedeagus, slightly expanded apicad (fig. 88); aedeagus elongate, tapering (fig. 89), apically hooked in lateral view; surstyli fused basally, somewhat expanded distally, and separated by deep cleft into dorsal and ventral arms; ventral arm subdivided into 2 lobes apically and bearing distinctive frayed seta ventrally; other gonopodal setae as illustrated; cerci with long, curved, dorsoapical bladelike seta, subtended ventrally by subrectangular cuticular projection with lateral leaflike modified seta; cercal projections may vary somewhat as shown (figs. 87, 90-92).

Female: Similar to male but without long setae ventrally on femur II.

Distribution: Holarctic: Eurasia from British Isles, Iberia, Fennoscandia, the Caucasus across to far eastern Siberia, Alaska, boreal Canada, North America east of High Plains, Rocky Mountains, and Coast Ranges south to southern California and Arizona (map 14); possible females from Hidalgo, Mexico; 674 specimens examined; collection dates: New York: 20-iv to 23-ix; Washington: 20-v to 3-ix.

Biology: Adults of *M. apicalis* have been collected from a variety of tree species. The following rearing records indicate a wide range of larval plant hosts, although, unlike the *signaticornis-pinicola* group, hardwoods seem preferred over conifers. Also, series have been reared from *Polyporus* bracket fungi from several localities in New Brunswick.

The rearing records of *M. apicalis* are as follows:

Plant host	*Locality*	*Remarks*
Abies balsamea	New Brunswick; Quebec.	
Acer macrophyllum.	Washington	
Aesculus glabra	Indiana	
Betula papyrifera	Maine	With buprestrid *Agrilus anxius.*
Castanea dentata	New York	Under bark with sciarid larvae.
Celtis occidentalis	Michigan	
Gleditsia triacanthos.	Indiana	
Picea sitchensis	Washington	
Pinus banksiana	Quebec	
P. contorta	Washington	Galleries of scolytid *Pityophthorus confertus.*
P. resinosa	Quebec	
Polyporus betulinus.	New Brunswick	
Populus deltoides	Illinois	Under bark of log.
P. trichocarpa	Washington	
Pseudotsuga menziesii.	---do.	Ex galleries of *Scolytus unispinosus.*
Pyrus sp.	Rhode Island	Under bark of cultivated apple.
Ulmus americana	Ontario; New York	Numerous records from scolytid-infested logs with Dutch elm disease.

Intraspecific Variation: *M. apicalis* is a widespread, commonly seen species, but owing to its variability, it is difficult to define, partly accounting for the number of Nearctic names placed here in synonymy. A similar situation exists in the Palearctic Region. Dr. Negrobov and I have discussed the problem, and we have approached it somewhat differently. He has tended to recognize a number of species that I would group together as being variants of a polytypic species. It must be emphasized that despite apparent variability in size and coloration, present even among individuals collected or reared from the same site, the male genitalia remain relatively constant across the entire range.

Specimens of *M. apicalis* from the drier western montane forests often have three distinct golden thoracic vittae (the "aurivittata" of Wheeler). However, at nearby higher elevations, in the dark, moister Engelmann spruce forests, the thorax may be much darker, with only a trace of the golden vittae. In eastern North America, these thoracic bands are usually faint or indistinct, although I have seen occasional specimens with distinct vittae.

Some specimens from Maryland, Tennessee, and North Carolina display a distinctly yellow antennal scape and pedicel (map 14), and they occur together with the more typical dark antennal *M. apicalis*. The two forms have similar genitalia and occur sympatrically, even together on the same tree. From a series of six males collected by G. Steyskal from Bethesda, Md., 22-vii-1972 (USNM), five had a yellow scape and pedicel and one had the more typical dark-brown antennae. In all other respects the specimens were similar. I regard the yellow scape and pedicel as representing a southern variant of an essentially circumboreal dark antennal species. It is interesting to note that *M. saguaroensis,* a distinctive Sonoran desert species probably derived from *M. apicalis,* has a yellow scape and pedicel.

A considerable size range is noted among collected specimens of *M. apicalis,* especially those reared from a single locality. The following range of wing length was observed from these rearings: Laniel, Quebec (2.2-2.5); New Brunswick *Polyporus* rearings (2.2-2.8); Skagit, Wash. (2.2-2.9); and Tompkins Co., N.Y. (2.1-2.8).

Remarks: The holotype of *M. apicalis* is a somewhat damaged female from Lund, Sweden. Thuneberg (1955) redescribed the holotype and designated a male "neoallotype" (ZMH, No. 8212). I have examined both specimens and they are consistent with the present species concept.

M. aurivittatus was described by Wheeler from two males and three females from Moscow, Idaho, and has the distinct golden vittae as discussed here. I have designated a male lectotype labeled "Moscow, Idaho; Aldrich" (AMNH) and regard it as a synonym of *M. apicalis.* Malloch described *M. caerulescens* from a reared pair in Illinois. The hypopygium of the male holotype is clearly that of *M. apicalis.* Van Duzee described female holotypes of both *M. frontalis* and *M. distinctus* from specimens taken in western New York. I regard them both as synonyms of *M. apicalis.*

From specimens taken on the Alaskan Katmai Expedition, Van Duzee described *M. parvus* and *M. bicolor* from males, both taken in June and July 1919 at Savonoski, Nahnek Lake. He distinguished *M. bicolor* by its having long pale hairs along the ventral surface of femur II, supposedly lacking in *M. parvus*. However, these delicate hairs show evidence of having been broken off the specimens of *M. parvus*. In all other respects, including hypopygial structure, the two species are identical, and are both regarded as synonyms of *M. apicalis*. The male holotype of *M. ciliatus* from Niagara Falls, N.Y., is badly damaged, missing the abdomen and most legs. From the thoracic chaetotaxy and general appearance, I regard it as *M. apicalis*.

Curran described two species, *M. venatus* and *M. simplicipes,* reared together from decaying chestnut bark in Nassau County, N.Y. The specimens are somewhat teneral and collapsed, which accounts for their pale coloration and apparent small size. The genitalia of the two male holotypes are identical, however, and are clearly *M. apicalis*. The male holotype of *M. orbiculata* from Berkeley, Calif., is of the "aurivittata" coloration and has the genitalia of *M. apicalis*.

I have been unable to locate the holotype of *M. albiciliata*. It should have been in the AMNH type collection, but it could not be found. The male holotype was collected by Curran at Arnprior, Ontario, on 18-viii-1930. A series of 11 males and 4 females at the USNM bears the same locality data and is distinctly *M. apicalis*. From Van Duzee's description and illustration of *M. albiciliata,* I am sure he was describing what should be regarded as a synonym of *M. apicalis*.

29. *Medetera saguaroicola,* sp. nov. [CAS]

Male: Length 2.4-2.5.

Head: Vertex, frons, face, clypeus metallic green with bronze reflections, covered by dense silvery pruinosity, although face and clypeus bare medianly; pedicel and scape yellow; 1st flagellomere dark brown, subrectangular, arista apical.

Thorax: Dorsum and pleura dark metallic green with bronze reflections, covered with gray pruinosity; major setae black; faint vittae over ac and laterally over dc are areas of reduced pruinosity, exposing green-bronze ground; 8-10 pairs ac, shorter than width of ac band; 4 strong dc, posterior 2 strong, next anterior 2 shorter, grading into setulae anteriorly; pale seta projecting ventrally from notopleural suture; lateral scutellars about 1/2 length of medians; 3-4 pale ppls., increasing in size ventrally.

Legs: Coxae, femora brown; femoral "knees," tibiae, tarsi yellow to yellow brown, tarsi infuscated distally; legs covered with dusting of pale pruinosity; all setae pale; I: 1.0; 0.9; 0.4/ 0.3/ 0.2/ 0.1/ 0.1; II: 1.0; 0.95; 0.55/ 0.3/ 0.2/ 0.1/ 0.1; III: 0.9; 1.2; 0.3/ 0.5/ 0.25/ 0.1/ 0.1; femur III with group of pale setae dorsobasally.

Wings: 2.5 × 0.95 (fig. 160); M arches up to R_{4+5}; wing ratio: 1:1.25; lower calypter and halteres pale yellow.

Abdomen: Brown with metallic green and bronze reflections, covered with gray pruinosity; hypopygium brown with yellow appendages; epandrium subrectangular, SH subequal to HL (fig. 93); basal epandrial lobe on mound twice as high as that of distal mound; epandrium with short setae along ventral edge between epandrial lobes and epandrial seta; hypandrium clasping aedeagus basally; aedeagus simple, apically hooked; surstyli fused basally, with deep cleft between thinner dorsal and thicker ventral lobes; ventral surstylus bearing curved frayed seta, other setae as illustrated; cerci with very wide dorsoapical bladelike seta, subtended ventrally by diamond-shaped process.

Female: Similar to male.

Distribution: Sonoran Desert: Arizona, northwestern Mexico (map 15); holotype, male; allotype, female; paratypes, 4 males, 8 females: ARIZONA: Pima Co., Saguaro National Monument; F. J. Santana, coll.; holotype taken xi-3, emerged xii-3, 1960; (UAT, holotype and allotype deposited CAS); 1 female paratype: ARIZONA: Winkleman (USNM); 1 male, 3 female paratypes: MEXICO: Baja California: N of San Felipe (USNM); emergence and adult collection dates all specimens: x-iv.

Biology: Reared from rotting saguaro cactus, *Carnegiea gigantea,* in Saguaro National Monument, Ariz., and from an unspecified cactus in Baja California. Adults have been observed running among the spines of saguaro cactus.

Remarks: As with most arid-land *Medetera,* this species has a pale cast. *M. saguaroicola* is possibly a specialized desert isolate of the widespread *M. apicalis;* the two species show a similar basic hypopygial structure.

30. *Medetera pseudosibirica,* sp. nov. [CNC]

Male: Length 2.4-2.5. (Note: All specimens are from forestry rearings and as such were pinned in a somewhat teneral condition; mature coloration is probably darker than that described here.)

Head: Vertex, frons dark brown, covered with dense gray pruinosity; face, clypeus dark metallic with only slight pruinose dusting; antennae brown; 1st flagellomere subtriangular, arista apical.

Thorax: Dorsum, pleura dark brown with metallic green reflections, covered with dense brown pruinosity; vittae not evident; 8-10 pairs ac, longer than length of ac band; 4 strong dc, posterior 2 longer than 2 immediately anterior, and grading into field of setulae anteriormost; 4 strong scutellars, laterals 3/4 length of medians; 2 pale ppls.

Legs: Coxae, legs brown, femoral "knees" paler; I: 0.9; 0.8; 0.35/ 0.2/ 0.15/ 0.1/ 0.1; II: 0.9; 0.8; 0.5/ 0.3/ 0.2/ 0.1/ 0.1; III: 0.9; 1.1; 0.3/ 0.45/ 0.3/ 0.15/ 0.1.

Wings: 2.6 × 1.05; M arches up to meet R_{4+5} as in *M. apicalis;* wing ratio: 1:1.6; lower calypter with brown rim and pale setae; club of halter infuscated.

Abdomen: Dark brown with metallic green reflections; hypopygium dark brown with brownish appendages; epandrium subrectangular in lateral view (fig. 94); distance of epandrial lobes to base of hypandrium subequal to distance base hypandrium to edge of epandrium; epandrial lobes with short collarlike bases; hypandrium clasping aedeagus basally, elongate with clublike apex (fig. 95); aedeagus tapering, simple; narrow dorsal surstylar arm separated by deep cleft from wider ventral arm; ventral surstylar arm with subapical curved frayed seta and medianly projecting plumose seta; cerci with dorsoapical bladelike seta, subtended ventrally by distinctive digitiform cuticular projection.

Female: Similar to male.

Distribution: Boreal Canada (map 16); holotype, male; allotype, female; paratypes, 4 males, 2 females: BRITISH COLUMBIA: Invermere, ex *D. monticolae;* holotype: 7-vi-1957; paratype dates 6 to 24-vi-1957; paratypes, 7 males, 13 females: QUEBEC: Laniel; cages 33, 50, 67, 68, 69, 71, 74, 79, 82, 84; vi-vii, 1933-34; (all CNC).

Biology: All specimens are from the following *M. pseudosibirica* rearings:

Tree host	*Scolytid associate*	*Locality*
Pinus banksiana	--	Quebec.
P. resinosa	--	Do.
P. strobus	*Ips pini*	Do.
P. strobus	*Dendroctonus ponderosae.*	British Columbia.

Remarks: *M. pseudosibirica* is a member of a group of boreal species including the Palearctic *M. tristis,* M. subtristis,** and *M. sibirica.** All species have a similar habitus, dark coloration, and distal cercal prolongation. (Both *M. tristis* and *M. subtristis* have left lateral projections on the aedeagus, and I suspect they are conspecific.)

It is possible that *M. pseudosibirica* is conspecific with *M. sibirica.* The genitalic illustration in Negrobov (1974, fig. 821) does not clearly show the distal structure of the cercus. The only male of *M. sibirica* is the holotype from Novosibirsk (ZIL). Unfortunately, when I examined the specimen, the hypopygium, which presumably had been cleared, could not be located.

31. *Medetera cyanogaster* Wheeler

Medetera cyanogaster Wheeler, 1899:27 [AMNH]

Male: Length 2.1-2.4.

Head: Vertex, frons, face dark metallic green, covered with gray pruinosity; clypeus shining dark metallic green on somewhat raised median ridge, pruinose laterally; pedicel and scape yellow; 1st flagellomere brown, subrectangular, about twice as high as long; arista apical.

Thorax: Dorsum metallic green with thick covering of gray pruinosity; vittae not evident; pleura grading to brown ventrad, still with thick covering of gray pruinosity; setae dark; 6-7 pairs ac, about as long as width of ac band; 5 strong dc, 2 longer subequals bordering mesoscutal depression; 3 shorter subequals anterior, with setulae anteriormost, extending laterally to humeral area; only 1 sa; 4 strong dark scutellars, laterals 2/3 length of medians; 2-3 pale ppls.

Legs: All coxae and legs yellow, although basal coxae and distal tarsomeres somewhat infuscated; coxae II and III with pale lateral setae; I: 0.85; 0.8; 0.4/ 0.25/ 0.15/ 0.1/ 0.1; II: 1.05; 0.9; 0.5/ 0.3/ 0.2/ 0.1/ 0.1; III: 1.0; 1.1; 0.25/ 0.5/ 0.25/ 0.15/ 0.1.

Wings: 2.7 × 1.1; M arched anteriorly, becoming subparallel with R_{4+5} distally; wing ratio: 1:2.5; lower calypter pale with pale setae; halteres pale.

Abdomen: Deep metallic blue with greenish reflections, and only faint dusting of pruinosity on 1st few terga; setulae black; hypopygium dark brown with pale appendages; epandrium subrectangular in lateral view (fig. 96); SH = EL; epandrial seta midway between epandrial lobes and hypandrial base; epandrial lobes with separate collarlike bases, adjacent, divergent; hypandrium wide, parallel sided, expanded somewhat subapically, and narrowing to apical nipple (fig. 97); median row of denticles near subapical expansion; hypandrium clasping aedeagus basally; aedeagus widened subapically, truncated with sharp apical point, with distinctive sinuous seminal duct as illustrated (fig. 98); surstyli somewhat expanded apically, dorsal arm extending farther distally, and ventral arm bearing stout thornlike seta projecting medianly, and other setae as illustrated; cerci with distinctive dorsoapical processes as shown.

Female: Similar to male.

Distribution: North America west of Rockies; recorded from Washington to southern California, all from forested localities (map 16); collection dates: vii-viii; 17 specimens examined.

Intraspecific Variation: Hypandrial denticles were absent in some California specimens.

Remarks: *M. cyanogaster* was described from a syntype series of three males and three females from Colfax, Wash. I have designated a male lectotype labeled, "Colfax, Wash./10.6.96; J. M. Aldrich" (AMNH). Based on the arrangement of the dc bristles, the morphology of the epandrium, and the hypandrium basally clasping the aedeagus, I have placed this somewhat isolated species in the *apicalis* group.

32. *Medetera longinervis* Van Duzee

Medetera longinervis Van Duzee, 1928b:36 [CAS]

Male: Length 2.7-2.9.

Head: Vertex, frons dark metallic blue, covered with gray pruinosity; face, clypeus metallic blue, finely coriaceous, with pruinosity laterally; antennae brown, 1st flagellomere subrectangular, arista apical; palpi and proboscis dark brown, although median surface of proboscis yellow.

Thorax: Dorsum and pleura dark metallic blue green, covered with gray-brown pruinosity; bronze vittae over ac band and laterally over dc, extending somewhat onto pleura; setae black; 6-8 pairs ac, length greater than width of ac band; 4 strong dc, decreasing somewhat anteriad, with distinct break in size to field of anteriormost setulae, which extends laterally to humeral area; 4 scutellars, laterals about 1/2 length of medians; 2-3 pale to infuscated ppls.

Legs: Coxae grading from metallic pleural coloration to brown distad; femora brown; femoral "knees," tibiae, and basal tarsomeres yellow to infuscated; distal tarsomeres darkened; lateral setae of coxae II and III pale; I: 0.8; 0.7; 0.3/ 0.25/ 0.15/ 0.1/ 0.1; II: 0.9; 0.8; 0.5/ 0.2/ 0.15/ 0.1/ 0.1; III: 1.0; 1.2; 0.25/ 0.45/ 0.25/ 0.1/ 0.1.

Wings: 2.2 × 1.1; M arches up toward R_{4+5}, and veins run in distinctive parallel alinement in distal 1/3 of wing to apex (fig. 161); wing ratio: 1:2.5; alula pale with pale setae; halteres pale yellow.

Abdomen: Metallic blue green with pruinose dusting and short pale setulae; segment 7 forming peduncle, elongate trapezoidal; epandrium ovate in lateral view (fig. 102); epandrial lobes with short separate bases; epandrial seta closer to epandrial lobes than to base of hypandrium; field of short setulae lies between epandrial lobes and epandrial seta; hypandrium broad, with expanded "wing" subapically, narrowing to truncated apex (fig. 104); hypandrial base "clasps" aedeagus; aedeagus broadly tridentate in ventral view (fig. 103); surstyli elongate with prominent subtriangular projection midventrally; distally, a distinctive, bent, bladelike seta projects ventromesad; cerci elongate, bearing strong, bent, bladelike seta dorsoapicad, subtended ventrally by striated leaflike seta mesad, and lateral flattened seta with truncated, 2-pointed apex.

Female: Similar to male.

Distribution: Western North America from Washington to southern California (map 15); 83 specimens examined; collection dates: Washington: vi-viii; southern California: x-iv.

Biology: Adults have been collected from *Arbutus menziesii, Pinus radiata,* and oak chaparral vegetation. Individuals have been reared from bark of *Pinus ponderosa, Quercus agrifolia, Acer macrophyllum* logs, and "rotten laurel." Many have been reared from bracket fungi, including *Polyporus gilvus, P. versicolor,* and *Lenzites betulina.*

Remarks: Van Duzee described *M. longinervus* from a rather greasy series taken at Olney, Oreg. In cercal structure, epandrial shape, and the "clasping" base of the hypandrium, this species clearly belongs to the *apicalis* group.

33. *Medetera furcata* Curran

Medetera furcata Curran, 1928:200 [NYSM]

Male: Length 2.6; specimens described are somewhat teneral.

Head: Vertex, face, frons, clypeus metallic green, covered by gray-brown pruinosity; antennae light brown; 1st flagellomere subtriangular, arista apical.

Thorax: Brown with greenish reflections, covered with gray pruinosity; 10-12 pairs ac, about as long as width of ac band; 5 strong dc, 2 strong subequals bordering mesoscutal depression, 3 shorter dc anterior, slightly decreasing in size, with field of setulae anteriormost; 4 strong subequal scutellars, 2-3 pale ppls.

Legs: Coxae, femora brown; femoral "knees," tibia, tarsi yellow to infuscated; distal tarsomeres darkened; I: 0.75; 0.65; 0.3/ 0.15/ 0.15/ 0.1/ 0.1; II: 0.8; 0.75; 0.4/ 0.2/ 0.15/ 0.1/ 0.1; femur II with some weak pale ventral setae; III: 0.9; 1.0; 0.25/ 0.35/ 0.20/ 0.1/ 0.1; tibia III with apicoposterior comb of short spines.

Wings: Elongate, 3.3 × 0.75; M gradually approaches R_{4+5}, 2 are subparallel in distal 3d; wing ratio: 1:1.75; alula pale with pale setae; halteres pale yellow.

Abdomen: Brown, covered with dusting of gray pruinosity; hypopygium dark brown, appendages yellowish; epandrium subtriangular (fig. 99); epandrial lobes adjacent with separate bases; short epandrial seta present; hypandrium elongate, blade shaped, with ventral band of tiny denticles (fig. 100); aedeagus elongate, tapering (fig. 101); surstyli deeply cleft, ventral arm with median hooklike seta subapically, and distinctive strong external seta near base of cleft; other surstylar setae as illustrated; cerci wide basally, tapering distally, without apical processes.

Female: Similar to male.

Distribution: New York: Nassau, Long Island (map 16); known only from type series of 2 males and 1 female reared from chestnut bark (*Castanea dentata*) infested with cecidomyiids, *Miastor metraloas* and *Lestodiplosis* sp.; collected 5-x-1910, emerged 15 to 26-iv-1911.

Remarks: Although the cerci of *M. furcata* are similar to those of the *signaticornis* group, the "clasping" hypandrium, the arrangement of dc, and the shape of the epandrium place this species well within the *apicalis* group.

The *crassivenis* group of species is characterized by the following male features:

(1) Basal sector of CuA with sausage-shaped expansion (synapomorphy) (figs. 112, 162); not present in females.
(2) Cerci prolonged distally, needlelike (synapomorphy).
(3) Epandrial seta is internal, not visible laterally.

The *crassivenis* group is Holarctic in distribution. Besides the two Nearctic species considered here, the following Palearctic species are included: *M. incrassata,* M. inspissata,* M. asiatica,* M. freyi,* M. thunebergi,* M. excellens,* M. tuberculosa,* M. infuscata,** and *M. protuberans.*

In general body habitus, dc chaetotaxy, and hypopygial morphology, this group displays strong affinities with the *apicalis* group. Females of the *crassivenis* group are difficult to distinguish from *apicalis* group females. It is interesting to note that an incrassated CuA has developed independently in the Palearctic *M. tumidula,** which has a hypopygial structure, especially cercal form, clearly that of the *apicalis* group.

In addition to the biology discussed here, Palearctic members of the group have been reared from scolytid-infested *Larix* (Schmitschek, 1930) and pine stumps (Nuorteva, 1956).

34. *Medetera crassivenis* Curran

Medetera crassivenis Curran, 1928:199 [NYSM]
Medetera idahoensis Harmston and Knowlton, 1943:106, SYN. NOV. [CAS]

Male: Length 1.8-2.2.

Head: Vertex, frons, face, clypeus black with metallic green reflections, covered with gray-brown pruinosity; eyes dark red, facets uniform; antennae dark brown; 1st flagellomere subrectangular, arista apical; palpi and proboscis shining dark brown; postorbitals short, dark dorsally, longer and paler ventrally; few dark setae on postcranial surface.

Thorax: Stout; dark metallic green to black, covered by dense brown pruinosity dorsally, less on pleura; setae black; 7-8 pairs ac, length greater than width of row; 4 strong dc, 2 longer subequals bordering mesoscutal depression, 2 shorter anteriorly, with setulae decreasing in length anteriormost; 4 strong scutellars, laterals half size of median pair; 2 brownish ppls.

Legs: Dark brown; femoral "knees" and basal tarsomeres yellowish; I: 0.7; 0.6; 0.25/ 0.15/ 0.12/ 0.1/ 0.075;

II: 0.7; 0.6; 0.3/ 0.15/ 0.1/ 0.075/ 0.075; III: 0.8; 0.75; 0.2/ 0.25/ 0.15/ 0.075/ 0.1; tarsomere III (1) with small tooth posterobasally.

Wings: 1.7 × 0.7 (fig. 162); M arched toward R_{4+5}; basal sector of CuA with sausage-shaped expansion; wing ratio: 1:2.5; upper calypter pale yellow with brown rim, setae pale; halter club infuscated to dark.

Abdomen: Black with metallic green reflections; setulae black; hypopygial capsule black with brownish appendages; epandrium cylindrical, tapering distally in lateral view (fig. 105); epandrial seta directed internally; epandrial lobes short, adjacent, each with separate socketlike base; hypandrium and aedeagus appearing distinctly bent in lateral view; hypandrium expanded at midlength (fig. 106); aedeagus with paired lateral appendages (fig. 107); surstyli curved; ventral surstylus broader, cleft apically; dorsal surstylus narrow; cerci narrowed, needlelike distad, and somewhat shorter than surstyli.

Female: Basal CuA not expanded.

Distribution: Nearctic: Rocky Mountains, eastern North America (map 15); known from 7 North American specimens: IDAHO: Sandpoint, 28-ix; MARYLAND: Colesville, 21-v; NEW YORK: Nassau, 10-v; Cooperstown, 24-viii; UTAH: Tony Grove, Cache Co., taken between 23-viii and 2-ix.

Biology: The holotype from Nassau, N.Y., was reared from decaying oak bark infested with the cecidomyiid *Leptosyna quercus* and sciarid larvae.

Remarks: The male holotype of *M. idahoensis* from Sandpoint, Idaho, is badly damaged, missing four legs and the postabdomen. Harmston and Knowlton's description of the species closely matches that of *M. crassivenis,* including mention of the needlelike "outer lamellae" (cerci). Although they distinguish *M. idahoensis* as having a wing ratio of 1:3, whereas Curran's description gives the ratio of *M. crassivenis* as 1:2, in reality, the ratio of *M. crassivenis* is also 1:3. Since the single male Utah specimen is clearly *M. crassivenis* and the type locality of *M. idahoensis* is nearby, I regard the two species as synonyms.

35. *Medetera marylandica* Robinson

Medetera marylandica Robinson, 1967:124 [USNM]

Male: Length 1.8; similar to *M. crassivenis* except as follows:

Legs: Leg I brown; legs II, III, with femora dark brown, femoral "knees," tibiae, and basal tarsomeres yellowish; I: 0.5; 0.4; 0.2/ 0.1/ 0.1/ 0.05/ 0.1; II: 0.6; 0.6; 0.25/ 0.1/ 0.1/ 0.05/ 0.05; III: 0.7; 0.7; 0.15/ 0.2/ 0.15/ 0.1/ 0.075.

Wings: 1.8 × 0.6 (fig. 112); basal sector of CuA with sausage-shaped thickening; wing ratio: 1:2; upper calypter pale with brownish setae; halteres pale yellow.

Abdomen: Hypopygial capsule dark brown with brownish appendages; epandrial lobes widely separated, with few short hairs on epandrial surface between lobes (fig. 108); hypandrium broad, expanded distally, and bearing tiny setae near tip (fig. 109); aedeagus in ventral view with paired lateral processes (fig. 110); dorsal and ventral surstyli subequal, fused together about half their length; ventral surstylus split apically, bearing prominent frayed seta ventrally; cerci narrowed distad, needlelike, and bearing apical bladelike seta (fig. 111).

Female: Unknown.

Distribution: Known only from male holotype, Bethesda, Montgomery Co., Md., 24-vii-1965 (map 15).

Remarks: In general hypopygial structure, position of epandrial lobes, and the frayed seta of the ventral surstylus, this species shows close affinities with the *apicalis* group.

The *diadema-veles* Group

The *diadema-veles* species group is a well-defined assemblage characterized by the following features:

(1) Hypopygium pyriform, inflated basally; EH = HL (synapomorphy).
(2) Epandrial lobes with bases adjacent, partially to completely fused, forming single collar from which setae arise (synapomorphy).
(3) Hypandrium elongate, narrow, tapering (synapomorphy).
(4) Epandrial seta reduced or totally lost (synapomorphy).
(5) Aedeagus elongate, tapering, simple; usually with pair of winglike appendages basad.
(6) Cerci usually with apical flattened unguiform setae.
(7) Usually 4 strong scutellars; laterals have been reduced or lost only in Palearctic assemblage.
(8) Surstyli fused almost to tip; dorsal surstylus usually extends somewhat beyond ventral.
(9) Male basitarşus III with anteroventral tooth near junction with tibia (fig. 8) (synapomorphy).
(10) Tibia II longer than femur II in all species.
(11) Female segment 9 + 10 with pair of apical projections.

The *diadema-veles* group is the most derived *Medetera* group, displaying various reductions and fusions of hypopygial structures. It is cosmopolitan in distribution and includes many commonly observed species. Several successful "tramp" species belong here, including the two probable introductions to North America, *M. diadema* and *M. truncorum;* two Palearctic airline stowaways to North America, *M. jacula* and *M. petrophila;* and the widespread Indo-Pacific tramp, *M. grisescens.** Adults are associated with a wide range of habitats, and some species are abundant in arid lands.

An assemblage with the epandrial seta present, though reduced, and with the bases of the epandrial lobes only partially fused includes the Holarctic *M. diadema, M. truncorum,* and *M. halteralis;* the Nearctic *M. arnaudi, M. modesta,* and *M. tuktoyaktuk;* and the Palearctic *M. jacula, M. ambigua,** *M. montana,** *M. dendrobaena,** *M. flavipes, M. petrophila,** and *M. tenuicauda.*

A Palearctic assemblage once placed in the genus *Oligochaetus* is characterized by highly reduced or lost lateral scutellars and apically blunt cerci, and it includes *M. plumbella, M. mixta,** and *M. micacea.**

A group of Palearctic arid-land species is centered around *M. lamprostoma,** including *M. deserticola** and *M. paralamprostoma** among others.

An assemblage in which the epandrial seta is totally lost and the epandrial lobe bases completely fused includes the Holarctic *M. veles;* the Nearctic *M. nigripes, M. canadensis, M. californiensis,* and *M. vittata;* and the Palearctic *M. infumata,** *M. nebulosa,** *M. spinulicauda, M. stylata,** *M. armenica,** *M. capillata,** *M. kerzhneri, M. mongolica,** and *M. victoris.**

M. pavlovskii from Iran has a narrow, highly elongated hypopygium.

The following features are common to all species in the *diadema-veles* group except where noted: Eyes red, antennae brown, palpi, proboscis dark brown, proboscis massive, and lower calypter and halteres yellow.

36. *Medetera diadema* (Linnaeus)

Medetera diadema (Linnaeus), 1767:993 (as *Musca*) [Linnean Society, London]
Medetera princeps Wheeler, 1899:25, SYN. NOV. [AMNH]

Male: Length 4.0-4.6.

Head: Ground color metallic green; vertex, frons, occiput covered with dense gray pruinosity; face metallic green with 2 faint longitudinal grooves; clypeus brilliant, metallic shining green blue, with no pruinosity; 1st flagellomere subrectangular; palpi dark brown with metallic green reflections; 2 rows of long pale postorbitals.

Thorax: Metallic green with bronze reflections, covered with dense brown-gray pruinosity; bronze vittae over ac band and laterally over dc and along border of mesoscutal depression; 12-14 pairs very short ac; 4 strong dc, 2 subequals bordering depression, and 2 shorter anteriorly; 1 strong pale postpronotal; 3-6 pale ppls, ventralmost usually stronger than rest.

Legs: Coxae brown; legs yellow to slightly infuscated; distal tarsomeres darkened; I: 1.7; 1.8; 0.8/ 0.65/ 0.4/ 0.2/ 0.2; II: 1.6; 2.0; 1.3/ 0.8/ 0.5/ 0.25/ 0.15; III: 1.8; 2.4; 0.5/ 1.2/ 0.65/ 0.3/ 0.2; femur III with long pale setae dorsobasally; tibia III dorsoapically with strong pale setae.

Wings: 4.4-5.0 × 1.1-1.3; wing ratio: 2:1.

Abdomen: Metallic green with dense gray pruinosity; setulae pale; hypopygium pyriform, elongate; short epandrial seta present; collars of epandrial lobes joined only at bases (fig. 119); internal hooklike structure present near bases of epandrial lobes; hypandrium and aedeagus elongate, tapering (figs. 120, 121); ventral surstylus lobe with disklike structure and bladelike seta; cerci with apical bladelike seta, subtended by ventral lobelike process.

Female: Similar to male.

Distribution: Western Palearctic Region in area bounded by Caucasus and Ural Mountains, North Africa, Fennoscandia, and British Isles; recorded from 18 specimens in United States (map 18): Farmingdale, N.J.; Newport, R.I.; Southbridge, Mass.; Hampton, N.H.; Berkeley and Hercules, Contra Costa Co., Calif.; collection dates: Eastern U.S., vii; California, vi-x.

Remarks: Wheeler (1899) described *M. princeps* from a series taken at Farmingdale, N.J. This series is identical to the Palearctic *M. diadema* and must be regarded as conspecific. Although I have not examined the type of *M. diadema,* I have seen many identified Palearctic specimens and am confident of its identity. This species is distinctive and has been clearly illustrated in Negrobov (1974, figs. 505-506).

The species' disjunct North American distribution strongly indicates its accidental human introduction to the continent. All the localities are near the coastal ports of New York, Newport, and Boston in the East and San Francisco in the West. The species is one of the largest and most striking of its genus, and if it had been widely distributed in North America, it certainly would have been collected. *M. diadema* is common throughout Europe and apparently has a broad ecological tolerance. I suspect it was accidently introduced, at least twice, perhaps being transported in ships' ballast. Lindroth (1957) has discussed extensively the question of trans-Atlantic ballast introductions and has cited many such examples for the Coleoptera.

The earliest eastern North American records are the New Jersey series from 1895. The species has become established in the East and apparently is spreading westward. The Southbridge, Mass., specimens were taken in 1955, at least 60 km from the coast. In California, the earliest record is 1952, from Contra Costa County. Paul H. Arnaud, Jr., (pers. commun.) has observed the species to be locally abundant in the area. It will be of interest to note any future geographical expansion of *M. diadema* in North America.

37. *Medetera truncorum* Meigen

Medetera truncorum Meigen, 1824:67 [Muséum National d'Histoire Naturelle, Paris]

Male: Length 2.7.

Head: Vertex, face, frons metallic green, covered by dense gray pruinosity; clypeus metallic blue green, shining but with minute punctures, and with pruinosity laterally and above suture; 1st flagellomere subrectangular; several rows of postorbitals, short, dark dorsally, becoming long and pale ventrally.

Thorax: Dorsum and pleura metallic green, covered with dense gray pruinosity; bronze vittae over ac, and laterally over anterior dc; 8 pairs very short ac; 4 strong dc, 2d anterior distinctly shorter than other 3; 3-4 pale ppls, ventralmost longer than others.

Legs: Coxae, legs dark brown to black, with pale femoral "knees"; coxae II and III each with pale lateral seta; I: 1.0; 1.0; 0.4/ 0.3/ 0.2/ 0.1/ 0.1; II: 1.0; 1.1; 0.6/ 0.35/ 0.3/ 0.15/ 0.1; III: 0.9; 1.35; 0.25/ 0.55/ 0.3/ 0.2/ 0.1; femur III with dorsobasal row of pale setae.

Wings: 2.5 × 1.0; M gradually arched toward R_{4+5}; wing ratio: 1:1.25.

Abdomen: Dark metallic green with heavy gray pruinosity; setulae pale; hypopygial capsule dark brown, as long as preabdomen, surstyli held between coxae at rest; capsule somewhat elongate, pyriform (fig. 122); short epandrial seta present; collars of epandrial lobes fused only basally, free distally; ventral surstylus bearing strong projecting seta from basal lobe and chacteristic forked seta from expanded distal lobe; dorsal surstylus enlarged distally with external prominent seta; cerci dorsoapically with curved blade-like projection, with socketed lobe ventrally, partially covered laterally by ventral projection; cerci with 3 strong setae ventrally.

Female: Similar to male.

Distribution: Western Palearctic: From Caucasus and Ural Mountains to western Europe, including North Africa; northwest Nearctic: Southern British Columbia, Washington, Oregon (map 18); 219 Nearctic specimens examined; collection dates: v-x.

Biology: Adults taken on fallen Douglas fir (*Pseudotsuga menziesii*); individuals reared from dead *Acer macrophyllum* and from *Prunus* bark. Numerous specimens have been taken from Malaise traps, especially females.

Remarks: I have not examined the type of *M. truncorum*. However, this species is distinctive and widespread in the western Palearctic. Negrobov (1977, fig. 898) has provided a diagnostic illustration of the hypopygium, and North American and European specimens are indistinguishable. *M. truncorum* appears well established in the Pacific Northwest and is possibly native, although it probably is a late introduction from the Palearctic, since there are no collection records earlier than 1942. Considering how relatively common the species is, one might expect earlier records if it were native, especially from the Aldrich and Melander collections, which are rich in northwest material. As

discussed by Lindroth (1957), many western European Coleoptera species have become established in the Pacific Northwest, probably from ballast introductions at ports along Puget Sound. *M. truncorum* is distributed along the Pacific coast and up the Columbia River, likely pathways for the spread of an immigrant species in the area.

38. *Medetera arnaudi* Harmston

Medetera arnaudi Harmston, 1951:12 [CAS]

Male: Length 3.1-3.4; a pale silvery species.

Head: Vertex, frons, face, clypeus metallic green, covered by dense silvery pruinosity; anteroventral eye facets somewhat enlarged in males; single row of postorbitals, short, dark dorsally, long and pale ventrally; scattered pale setae on postcranium.

Thorax: Dorsum and pleura metallic green with bronze reflections, covered with dense silvery pruinosity; pale bronze vitae over ac; 9 pairs short ac; 4 strong dc, 2d anterior distinctly shorter than others; 2 dark postpronotals, with extra, strong pale seta projecting laterally from notopleural suture; lateral scutellars 3/4 length of medians; 3 strong pale to infuscated ppls.

Legs: Coxae II and III dark brown; remainder of legs yellow, although distal tarsomeres somewhat darkened; I: 1.2; 1.15; 0.5/ 0.4/ 0.3/ 0.15/ 0.15; II: 1.15; 1.3; 0.75/ 0.4/ 0.3/ 0.15/ 0.15; III: 1.25; 1.6; 0.35/ 0.7/ 0.4/ 0.2/ 0.15; femur III dorsobasally with long pale setae; tibia III with dark dorsal seta at 1/5, dorsoapically with tuft of pale setae.

Wings: 3.5 × 1.25; M gradually arched toward R_{4+5}; wing ratio: 1.2:1.

Abdomen: Green brown, covered with dense silvery pruinosity; setulae pale; hypopygial capsule black shining with yellowish appendages; when surstyli held between coxae III at rest, basal part of hypopygium projects posteriorly, well beyond tip of preabdomen; epandrium pyriform, greatly inflated basally, with relatively short surstyli (fig. 123); short epandrial seta present; bases of epandrial lobes fused into single socket, strong apical bristles expanded apically, brushlike; aedeagus and hypandrium bulbous basad, tapering distad (figs. 124, 125); ventral surstylar lobe with prominent projecting seta; dorsal lobe with strong recurved seta; cerci narrowed distad; cerci with strong apical bladelike seta, subtended ventrad by lesser bladelike setae.

Female: Eye facets uniform in size; otherwise similar to male.

Distribution: California, Central Valley and Coast Ranges (map 19); 229 specimens examined; collection dates: iv-ix.

Remarks: Adults have been taken from such vertical surfaces as fences and tree trunks.

39. *Medetera halteralis* Van Duzee

Medetera halteralis Van Duzee, 1919:267 [CAS]
Medetera tarasovae Negrobov, 1974:345, SYN. NOV. [ZIL]

Male: Length 2.4-3.4; a black species.

Head: Vertex, face, frons black, covered with brownish pruinosity; clypeus shining black, with pruinose dusting laterally; 1st flagellomere subtriangular; 2 rows of black postorbitals, with few black setae on postcranium.

Thorax: Black, covered with brown pruinosity dorsally, less on pleurae; discernible vittae lacking; 9-10 pairs ac, greater than length of ac band; 5 strong dc, decreasing anteriorly; lateral scutellars 3/4 length of medians; 2-3 black ppls.

Legs: Entirely black with black setae; I: 1.0; 0.85; 0.45/ 0.3/ 0.2/ 0.1/ 0.1; II: 0.95; 1.1; 0.65/ 0.4/ 0.25/ 0.15/ 0.1; III: 1.1; 1.2; 0.3/ 0.7/ 0.35/ 0.2/ 0.1; femur III with few strong dorsobasal setae.

Wings: 2.0-2.8 × 0.9-1.1; M relatively straight, not arched up toward R_{4+5}; wing ratio: 1:1; upper calypter with dark brown rim and dark setae; halteres infuscated to black.

Abdomen: Black with black setulae; hypopygial capsule black, with brownish appendages; epandrium pyriform (fig. 126); epandrial seta present, slightly basad of epandrial lobes; bases of epandrial lobes adjacent, but not totally fused; aedeagus and hypandrium elongate, tapering; ventral surstylar lobe bearing some apical bladelike setae; dorsal surstylus with prominent seta, and basally with distinctive dorsal protuberance just above cerci; cerci apically with bladelike seta, subtended ventrally by 2 flattened setal appendages.

Female: Similar to male.

Distribution: Holarctic: Eastern Siberia and boreal North America, Alaska to Labrador, south to New York and Idaho (map 20); 28 Nearctic specimens examined; collection dates: vi-viii.

Biology: A female was observed ovipositing in galleries of *Ips pinus* in Alberta; specimens have been reared from scolytid-infested *Pinus resinosa* in Quebec.

Intraspecific Variation: Ratio of III tarsomere (1):III tarsomere (2), varies from 2.5:7 to 2.5:6; northern specimens from Alaska and Yukon tend to be larger than more southern specimens; specimens from western North America tend to have more developed dorsal protuberance on gonopod than do specimens from eastern boreal forests.

Remarks: I have examined the male holotype of *M. tarasovae* and consider it a junior synonym of *M. halteralis*. *M. halteralis* is closely related to *M. modesta* (q.v.), and their ranges overlap somewhat in southern Ontario.

40. *Medetera modesta* Van Duzee

Medetera modesta Van Duzee, 1914:440 [ANSP]

Male: Length 3.1-3.9.

Head: Vertex, frons, face dark metallic blue green with dense gray pruinosity; clypeus shining metallic blue green with pruinosity laterally; 2 rows of pale postorbitals, 1 row along eye margin, other with longer setae on postcranium.

Thorax: Black with bronze reflections and covered with dense brown pruinosity; chaetotaxy as in *M. halteralis* except ppls pale, not dark.

Legs: Dark brown; coxae with brownish setae; I: 0.9; 0.95; 0.45/ 0.4/ 0.3/ 0.15/ 0.1; II: 1.0; 1.1; 0.65/ 0.45/ 0.3/ 0.15/ 0.1; III: 1.15; 1.3; 0.25/ 0.7/ 0.45/ 0.2/ 0.1.

Wings: Elongate, 2.6 × 0.95; M relatively straight, not upcurved toward R_{4+5}; wing ratio: 1:1.25; upper calypter pale with pale setae; halter club often infuscated.

Abdomen: Black with gray-brown pruinosity; hypopygium black with brownish appendages; short epandrial seta present basad of epandrial lobes (fig. 127); bases of epandrial lobes adjacent, but not fused; aedeagus and hypandrium elongate, tapering; dorsal and ventral surstylar lobes separated by cleft, with some rugosity on basad of cleft; ventral surstylar lobe bearing setae as illustrated; cerci with large, curved dorsoapical seta, separated by U-shaped gap from large ventroapical lobe with 2 adjacent ventral setae.

Female: Similar to male.

Distribution: Eastern North America from Florida to southern Ontario (map 20); 15 specimens examined; collection dates: iv (Florida) to ix.

Remarks: This species is closely related to *M. halteralis*, showing similarities in wing form, hindtarsal ratios, gonopodal structure, and general hypopygial form.

41. *Medetera californiensis* Wheeler

Medetera californiensis Wheeler, 1899:27 [AMNH]
Medetera longimana Van Duzee, 1933a:12 (syn. Arnaud, 1963) [AMNH]

Male: Length 2.9-3.5.

Head: Vertex, frons, face dark green, covered with thick gray pruinosity; clypeus dull metallic green; 1st flagellomere subtriangular; single row of pale postorbitals.

Thorax: Dorsum and pleura dark metallic green, covered with dense silvery pruinosity; 3 distinct dorsal bronze vittae over ac and laterally over dc fading out at edge of mesoscutal depression; 10-12 pairs short ac; 4 strong dc, posterior 2 subequal and longer than 2 subequal anteriors; lateral scutellars 2/3 length of medians; 3 pale ppls.

Legs: Coxae, femora brown; femoral "knees," remaining legs yellow to infuscated; distal tarsomeres darkened; I: 1.3; 1.2; 0.5/ 0.45/ 0.3/ 0.15/ 0.1; II: 1.3; 1.4; 0.7/ 0.5/ 0.3/ 0.2/ 0.1; III: 1.4; 1.7; 0.4/ 0.9/ 0.4/ 0.2/ 0.15; femur III dorsobasad with long, pale setae; tibia III dorsoapicad with group of pale setae.

Wings: 3.0 × 1.2; M arches toward R_{4+5}, subparallel distally; wing ratio: 1:1.2; lower calypter yellow with pale hairs; halteres pale.

Abdomen: Dark metallic green, covered with dense gray pruinosity; setulae pale; hypopygium dark brown, pyriform (fig. 128); epandrial lobes with bases completely fused, forming long collar, and their bristles with short hairs distally; hypandrium and aedeagus elongate, tapering (figs. 129, 130); ventral surstylar arm with spearlike seta; cerci with distinctive long, curved dorsoapical needlelike seta, separated by cleft from ventral lobe; 3 short setae on ventral mound.

Female: Similar to male.

Distribution: Western North America from southern British Columbia to southern California and Arizona (map 21); 57 specimens examined; collection dates: i-xii, coastal California, and vi-ix, Washington.

Remarks: Wheeler described *M. californiensis* on the basis of four males and six females from Palo Alto, Calif. I have designated a male as lectotype, labeled "Palo Alto, Calif./10-20 94" (AMNH). Van Duzee's *M. longimana* is to be regarded as a synonym, as discussed by Arnaud (1963).

This species appears close to a group of Palearctic species centered around *M. lamprostoma,** predominating in the more arid regions of the Old World.

42. *Medetera tuktoyaktuk*, sp. nov. [CNC]

Male: Length 2.4.

Head: Vertex, face, frons dark brown with metallic green reflections, and covered in gray-brown pruinosity; clypeus shining dark brown; single row of pale postorbitals, short, dark dorsally, long, pale ventrally.

Thorax: Dark brown, covered with gray-brown pruinosity; brown vittae over ac, laterally over dc; (dorsal setae missing from holotype); lateral scutellars about 1/3 length of medians; 2 brownish ppls.

Legs: Dark brown; I: 0.75; 0.6; 0.25/ 0.2/ 0.15/ 0.1/ 0.1; II: 0.65; 0.75; 0.4/ 0.25/ 0.15/ 0.1/ 0.1; III: 0.8; 0.9; 0.2/ 0.35/ 0.2/ 0.15/ 0.1.

Wings: 1.8 × 0.75; venation similar to that of *M. veles;* wing ratio: 1:1.25; lower calypter pale with pale setae; stem of halter somewhat infuscated, club pale.

Abdomen: Dark brown with metallic green reflections, covered with brown pruinosity and short pale setulae; hypopygium elongate, pyriform, and black (fig. 131); bases of epandrial lobes only partially fused, distal parts free; bristles of epandrial lobes unbranched; epandrial seta absent; hypandrium and aedeagus elongate, tapering; ventral surstylar lobe with styluslike seta; cerci elongate, apically with 2 bladelike setae and group of 3 setae midventrally.

Female: Unknown.

Distribution: Known only from the male holotype: NORTHWEST TERRITORIES: Mackenzie Delta, 20 miles east of Tuktoyaktuk, 15-vii-1971, W. R. M. Mason, coll., (CNC), (map 20); the specimen is somewhat rubbed, missing the dorsal thoracic bristles.

43. *Medetera nigripes* Loew

Medetera nigripes Loew, 1861:73 [MCZ]

Male: Length 2.5.

Head: Vertex, frons, face black with metallic green reflections, and covered with dense brown pruinosity; clypeus shining black with pruinosity laterally; single row of postorbitals, short, black dorsally, long, pale ventrally.

Thorax: Dark brown with bronze reflections, covered by gray-brown pruinosity; brown vittae over ac band and laterally over dc; 7-8 pairs ac; 4 strong dc, 2 longer subequals bordering mesoscutal depression and 2 shorter anteriorly; lateral scutellars about 1/2 medians; 2 black ppls.

Legs: Dark brown, with slightly paler femoral "knees"; I: 0.9; 0.8; 0.35/ 0.3/ 0.2/ 0.1/ 0.1; II: 1.1; 1.2; 0.55/ 0.3/ 0.2/ 0.15/ 0.1; III: 1.1; 1.3; 0.25/ 0.6/ 0.3/ 0.15/ 0.1; tibia III with dorsoapical tuft of setae.

Wings: 2.6 × 1.0; M gradally approaches R_{4+5}; wing ratio: 1:1.5; upper calypter pale to infuscated with pale setae; halter with infuscated club.

Abdomen: Dark brown with dusting of brown-gray pruinosity; hypopygium black, pyriform (fig. 132); epandrial seta absent; bases of epandrial lobes almost entirely fused, their bristles with some distal branching (fig. 135); hypandrium and aedeagus elongate, tapering (fig. 133); surstyli bearing apical setae as illustrated; cerci with distinctive large, toothed apical hook, and more ventrobasal bilobate structure, bearing strong pubescent seta; (dorsal view of cerci, fig. 134).

Female: Similar to male.

Distribution: Boreal North America: Great Lakes, southern Canada east to Maritimes and New England; single male from 59 Mile House, Cariboo Highway, British Columbia, (map 21); 76 specimens examined; collection dates: v-vii.

Remarks: Loew based *M. nigripes* on a single female from the "Middle States." The holotype (MCZ) is similar to females from a Randolph, N.H., series (also MCZ). A specimen from this series has been taken to represent the male and placed with the holotype. (Also, see remarks under *M. canadensis.*)

44. *Medetera canadensis,* sp. nov. [CNC]

Male: Length 2.1-2.4; a dark species.

Head: Vertex, face, frons, clypeus metallic green, covered with dense brown pruinosity; single row pale postorbitals, with scattered pale setae on postcranium.

Thorax: Dorsum, pleura dark metallic green, covered with dense brown pruinosity; faint brown vittae over ac band and laterally over dc; 9-10 pairs ac; 4 strong dc, 2 subequal posteriors longer than 2 shorter anteriors; lateral scutellars more than 1/2 length of medians; 2-3 dark ppls.

Legs: Dark brown to black; I: 0.8; 0.65; 0.3/ 0.2/ 0.1/ 0.1/ 0.1; II: 0.7; 0.8; 0.45/ 0.25/ 0.2/ 0.1/ 0.1; III: 0.8; 1.1; 0.2/ 0.4/ 0.2/ 0.1/ 0.1; tibia III with tuft of dorsoapical bristles.

Wings: 2.2-2.4 × 0.95-1.0 (fig. 163); M gently arches toward R_{4+5}; wing ratio: 1:1.5; upper calypter pale with brown rim; halter stem infuscated, club pale.

Abdomen: Dark metallic green with brown pruinosity and black setulae; hypopygial capsule shining black, pyriform (fig. 136); epandrial seta lacking; bases of epandrial lobes fused, their bristles as in figure 137; hypandrium and aedeagus elongate, tapering distally; aedeagus with slight bulbous expansion before apex; surstyli bearing apical setae as illustrated; cerci with distinctive long, curved, modified seta dorsoapically; cerci ventrally with lobate socketed structure and subtended by 3 setae.

Female: Similar to male.

Distribution: Eastern North America from Manitoba to New Brunswick, south to Virginia (map 21); holotype, male; allotype, female: NEW BRUNSWICK: Doaktown,

Highway 8, 7-viii-1971, B. V. Peterson, coll. (CNC); 39 male, 49 female paratypes: MANITOBA: Ninette; 2 mi. west Stockton; MICHIGAN: Branch, Lake Co.; Cheboygan Co.; MINNESOTA: Itasca State Park; NEW BRUNSWICK: Doaktown; Frederickton; Kouchibouguac National Park; NEW YORK: Ringwood Ponds, Tompkins Co.; Seneca Co.; Albany; Cherrytown, Ulster Co.; Lewisboro, Westchester Co.; ONTARIO: Algonquin Provincial Park; Mer Bleu, Ottawa; Bells Corner; Washago; Maynooth; QUEBEC: Gatineau Park; VIRGINIA: Big Meadow, Shenandoah National Park; (paratypes deposited CNC, MSUE, UMSP, CUIC, NYSM, AMNH, USNM); collection dates: 21-v to 12-viii.

Biology: Adults have been collected on the trunks of *Abies balsamea, Pinus strobus, Quercus* sp., and *Populus* sp.; on *Rosa arkansana* and *Spiraea* flowers; specimens have been reared from scolytid-infested *Picea abies.*

Remarks: This species is closely related to *M. nigripes,* with which it is broadly sympatric. Although the two species have been taken together in the same Malaise trap at Cherrytown, N.Y., *M. canadensis* persisted later into the season than *M. nigripes.*

45. *Medetera vittata* Van Duzee

Medetera vittata Van Duzee, 1919:268 [CAS]

Male: Length 2.3-2.6.

Head: Vertex, frons, face dark metallic green, covered with gray-brown pruinosity; clypeus metallic green, with pruinosity laterally; single row pale postorbitals with few pale setae on postcranium.

Thorax: Dorsum and pleura dark metallic green, covered with gray pruinosity; brown vittae present over ac band, ending at mesoscutal depression, and laterally over dc; setae black; 9-10 pairs ac; 4 strong dc, posterior 2 longer than anterior 2; lateral scutellars 3/4 length of medians; 2-3 dark ppls.

Legs: Coxae, femora black to femoral "knees"; remainder of legs yellow to infuscated; distal tarsomeres darkened; I: 0.95; 0.9; 0.45/ 0.35/ 0.2/ 0.1/ 0.1; basitarsus I with distinctive ventral comb of strong setae, basal 5 or 6 setae distinctly longer than width of tarsomere (fig. 142), present in both males and females; II: 0.95; 1.1; 0.6/ 0.4/ 0.25/ 0.15/ 0.1; III: 1.1; 1.3; 0.25/ 0.65/ 0.3/ 0.2/ 0.1.

Wings: 2.4-2.6 × 1.0 (fig. 164); M gradually approaches R_{4+5}; wing ratio: 1:1.25; lower calypter yellow with pale setae; halteres yellow.

Abdomen: Black with green reflections, covered with dense gray pruinosity, setulae black; hypopygial capsule black with brownish appendages, pyriform (figs. 138, 139); epandrial seta absent; bases of epandrial lobes fused into elongate collar, their bristles branched (fig. 141); hypandrium and aedeagus elongate, tapering; aedeagus with paired lateral processes (fig. 140); distal surstyli with setae as illustrated; cerci with distinctive, pointed, dorsoapical cuticular projection and somewhat rounded, ventroapical projection, between which is weak, flattened bladelike seta.

Female: Similar to male.

Distribution: Eastern North America, south of taiga and east of High Plains (map 19); records from Alberta and Washington may indicate accidental introductions; commonly seen, more than 1,100 specimens examined; collection dates in New York and Ontario from 21-v to 4-x.

Biology: *M. vittata* is one of the commonest species in the deciduous forests of eastern North America. Unlike its close relative, *M. veles,* it has been unable to penetrate the arid regions west of the Mississippi, except in river valleys. Adults often congregate in great numbers on tree trunks, and it is not unusual to take more than 30 individuals off a single trunk. Tree position or bark texture is probably more important than species in determining the attractiveness of a tree as an aggregating site (see Bionomics Section). *M. vittata* has been collected from various hardwoods and conifers, both native and introduced ornamentals. The immature stages are unknown, although specimens have been reared from pupae in sandy garden soil and from scolytid-infested *Pinus strobus* and *Picea abies* in New Brunswick.

Remarks: The holotype and allotype of *M. vittata* are from Kearney, Ontario. *M. vittata* is morphologically close to *M. veles,* and the two species occur sympatrically over a wide area. The foretarsal comb, dorsoapical cuticular cercal projection, and larger size distinguish *M. vittata* from *M. veles.* However, I have seen specimens from Highlands, N.C., that had the foretarsal comb, but they lacked the cuticular cercal projection, and the hypopygium was like that of *M. veles.* This may be evidence for occasional hybridization between these two probable sister species.

46. *Medetera veles* Loew

Medetera veles Loew, 1861:73 [MCZ]
Medeterus appendiculatus Wheeler, 1899:73 (preocc. Macquart, 1827) [AMNH]
Medetera bilineata Frey, 1915:52, SYN. NOV. [ZMH]
Medetera intermedia Van Duzee, 1928a:40, SYN. NOV. [CNC]
Medetera albosetosa Van Duzee, 1928b:36, SYN. NOV. [SMEK]

Medetera wheeleri Foote, Coulson, and Robinson, 1965:511 (nom. nov. for *appendiculatus* Wheeler), SYN. NOV.
Medetera sphaeropyga Negrobov, 1974:310, SYN. NOV. [ZIL]

Male: Length 2.4-2.6.

Head: Vertex, frons, face dark metallic green, covered with dense brown pruinosity; clypeus metallic green, finely coriaceous, with pruinosity laterally; antennae brown; 1st flagellomere ovate; postorbitals and postcranials usually pale, but black in some Florida specimens.

Thorax: Dorsum, pleurae dark metallic green, covered with dull gray pruinosity; brown vittae over ac and laterally over dc (vittae sometimes obscured); 7-8 pairs ac, slightly shorter than width of ac band; 4 dc, 2 longer subequals bordering mesoscutal depression, 2 shorter subequals anteriorly, 1 of which is sutural, 3-4 setulae anteriormost; 4 scutellars, laterals slightly more than 1/2 length of medians; 2-3 ppls, dark.

Legs: Coxae, femora infuscated to dark brown; tibiae, tarsi vary from yellow to brown; I: 0.95; 0.9; 0.4/ 0.3/ 0.2/ 0.1/ 0.1; II: 1.0; 1.05; 0.55/ 0.4/ 0.25/ 0.1/ 0.1; III: 0.8; 1.0; 0.25/ 0.60/ 0.35/ 0.15/ 0.1; tibia III with some pale bristles dorsoapically in male basitarsus with basal tooth anteroventrally.

Wings: 1.9-2.4 × 1.0; M gradually approaches R_{4+5}, often 2 veins appear to be slightly constricted subapically; wing ratio: 1:1.25; lower calypter and halteres pale yellow.

Abdomen: Dark metallic green, covered with grayish pruinosity; hypopygium pyriform, capsule black with brown appendages (figs. 143, 144); bases of epandrial lobes fused, forming short cylinder, apical parts of their bristles branched; hypandrium and aedeagus elongate, tapering; surstyli fused basally, separated into dorsal and ventral lobes by deep cleft; ventral arm with bladelike seta subapicad, other setae as shown; cerci with dorsoapical bladelike seta of various configurations (figs. 145, 149); ventroapicad on cercus is striated, lobate seta, subtended ventromedianly by group of 2-3 setae.

Female: Similar to male, but lacks tibia III bristles and basal tooth on basitarsus III.

Distribution: Holarctic: Eurasia; Alaska, Canada, south of tundra, south to Florida Keys and Mexico City (map 22); common, often abundant; collection dates: Florida: x-vi; Minnesota: v-ix; adults probably present year round in suitable climates; more than 1,900 specimens examined.

Biology: *M. veles* has been collected from a wide range of habitats, ranging from subtropical coastal Florida to near tree line at 3800 m in Colorado. It is often taken in great numbers from agricultural areas, especially from alfalfa, winter wheat, cottonfields, and grasslands. Although common throughout moist eastern North America, it seems to favor open, exposed, and drier habitats, as opposed to the moist woodlands frequented by its close relative, *M. vittata*. *M. veles* is the commonest species in the arid and semiarid regions of the continent. Adults are taken off tree trunks, large rocks, bare soil, and swept from herbaceous vegetation. Despite its abundance, nothing is known of the immature stages. R. W. Meyer (pers. commun.), commenting that *M. veles* is the most consistently seen dolichopodid in alfalfafields, suggested it may be associated with the clover root borer, *Hylastinus obscurus* (Scolytidae). If *M. veles* larvae were predacious on this scolytid, then the species would be an important biological control agent, not to mention the adult habit of feeding on such soft-bodied arthropods as aphids, thrips, coccids, and mites.

M. veles adults have been found with attached larval erythraeid mites.

Intraspecific Variation: The most obvious form of intraspecific variation in *M. veles* is that of color, often correlated with habitat changes. Specimens from the drier, more exposed Great Plains and Rocky Mountains have paler legs, a more silvery pruinosity, and a more pronounced vittate pattern on the mesonotum. Western specimens often display a slight "wineglass" indentation of wing veins M and R_{4+5} just before the apex. Specimens from eastern North America often have darker legs, a more gray pruinosity, and sometimes obscured vittae.

A distinct form of *M. veles* with black setae on the postcranium occurs in Florida. Typically, the species has pale postorbitals and a few scattered pale setae on the postcranium. In the Florida form, the postorbitals and postcranial setae are distinctly black and found in both sexes. I have seen this form only from the Florida peninsula (map 22), and it occurs sympatrically with the more typical *M. veles,* the two having been taken together at Gainesville, Highlands, Bradenton, and Monroe County, sometimes from the same Malaise trap. The black setal form is much less common than the typical pale form, and I have only seen 12 specimens of it as compared with 214 specimens of the typical form from Florida. There is no significant difference in the genitalia between the two, and I regard them as conspecific.

A range of hypopygial variation occurs within *M. veles*. The most obvious is the shape of the dorsoapical bladelike cercal seta (see figs. 145-149). Such variation may be found within long series from certain localities, and I regard them as representing one species. (Although specific localities are given in the figure legend for each drawing, the setal shape is not necessarily restricted to these localities.) Other genitalic variation includes the length of the bristles on the epandrial lobes and the extent of fusion of the epandrial lobes into a collarlike pedicel.

M. veles must therefore be regarded as a common, widespread, but variable species. It may represent a complex of sibling species, but this problem cannot be resolved on gross morphology alone. It certainly represents a monophyletic assemblage.

Remarks: Loew described *M. veles* from a male taken in Florida. *M. appendiculatus*, described by Wheeler from a male taken in Wyoming, is an aberrant specimen with a vein stub on the m-cu crossvein and is regarded as a synonym. The name "*appendiculatus*" had been preoccupied by *appendiculatus* Macquart, 1827, and was replaced with *wheeleri* by Foote, Coulson, and Robinson (1965). Van Duzee's *M. albosetosa*, based on a single male from Galveston, Tex., (fig. 147), and *M. intermedia*, based on a male from Saskatchewan, are also considered synonyms. I have examined the male holotypes of *M. bilineata* from Finland and *M. sphaeropyga* from the Ussuri District, Siberia, and consider them junior synonyms of *M. veles*.

Literature Cited

Arnaud, P. H., Jr. 1963. *Medetera longimana* Van Duzee, a synonym of *Medetera californiensis* Wheeler. Proc. Ent. Soc. Wash. 65:62-63.

Beaver, R. A. 1966. The biology and immature stages of two species of *Medetera* (Diptera: Dolichopodidae) associated with the bark beetle *Scolytus scolytus* (F.). Proc. Ent. Soc. London 41:145-190.

Becker, T. 1914. Diptères nouveaux récoltés par M. Ch. Alluaud et R. Jeannel en Afrique orientale. Ann. Soc. Ent. Fr. 83:120-130.

Becker, T. 1917-18. Dipterologische Studien, Dolichopodidae. Nova Acta Acad. Caesar. Leopolidina Carol. 102:113-361 (1917); 103:203-315 (1918); 104:35-214 (1918).

Becker, T. 1922a. Dipterologische Studien. Dolichopodidae. B. Nearktische und neotropische Region. Zool.-Bot. Gesell. Wien, Abhandl. (1921) 13:1-394.

Becker, T. 1922b. Dipterologische Studien. Dolichopodidae der Indo-Australischen Region. Capita Zool. 1 (4):1-247.

Becker, T. 1923. Dipterologische Studien. Dolichopodidae der Aethiopische Region. Ent. Mitt. 12:1-49.

Borden, J. H. 1982. Aggregation pheromones. *In* Mitton, J. B., and K. B. Sturgeon, eds., Bark beetles in North American conifers, p. 74-139. Univ. Texas Press, Austin.

Camors, F. B., and T. L. Payne. 1973. Sequence of arrival of entomophagous insects to trees infested with southern pine beetle. Environ. Ent. 2:270-276.

Chilcott, J. G. 1960. A revision of the Nearctic species of Fanniinae (Diptera: Muscidae). Canad. Ent. Sup. 14:1-295.

Colless, D. H. 1963. An Australian species of *Microphorella* (Diptera: Empididae) with notes on the phylogenetic significance of the genus. Proc. Linn. Soc. N.S. Wales 88:320-323.

Collin, J. E. 1941. The British species of the dolichopodid genus *Medeterus* Fisch. (Dipt.). Ent. Monthly Mag. 77:141-153.

Cregan, M. B. 1941. Generic relationships of the Dolichopodidae (Diptera), based on a study of mouthparts. Ill. Biol. Monog. 18:1-68.

Curran, C. H. 1927. Records and descriptions of South African Diptera with notes on two Wiedmann types. Ann. Transvaal Mus. 12:181-185.

Curran, C. H. 1928. New eastern species of *Medeterus* (Dolichopodidae, Diptera). Bull. N.Y. State Mus. 274:199-204.

Dahlsten, D. L. 1982. Relationships between bark beetles and their natural enemies. *In* Mitton, J. B., and K. B. Sturgeon, eds., Bark beetles in North American conifers, p. 140-182. Univ. Texas Press, Austin.

DeLeon, D. 1935. A study of *Medetera aldrichii* Wh. (Diptera: Dolichopodidae), a predator of the mountain pine beetle (*Dendroctonus monticolae* Hopk., Coleoptera, Scolytidae). Ent. Amer. 15:59-89.

Deyrup, M. A. 1978. Notes on the biology of *Pissodes fasciatus* LeConte and its insect associates (Coleoptera: Curculionidae). Pan-Pac. Ent. 54:103-106.

Deyrup, M. A., and R. I. Gara. 1978. Insects associated with Scolytidae (Coleoptera) in western Washington. Pan-Pac. Ent. 54:270-282.
Dyte, C. E. 1959. Some interesting habitats of larval Dolichopodidae. Ent. Monthly Mag. 95:139-143.
Dyte, C. E. 1975. Family Dolichopodidae. *In* Delfinado, M. D., and D. E. Hardy, eds., A catalog of the Diptera of the Oriental Region, v. 2, p. 212-260. Univ. Press, Hawaii, Honolulu.
Dyte, C. E., and K. G. V. Smith. 1980. Family Dolichopodidae. *In* Crosskey, R. W., ed., Catalogue of the Diptera of the Afrotropical Region, p. 443-463. Brit. Mus. (Nat. Hist.), London.
Fallén, C. F. 1823. Monographia Dolichopodum Sveciae. P. 1-16, 17-24. Lund.
Fischer von Waldheim, G. 1819. Programme d'invitation ã la séance publique de la Société Impérial des Naturalistes, qui aura lieu le 15 Decembre, contenant une notice d'une mouche carnivore. 11 p. Moscou.
Fitzgerald, T. D., and W. P. Nagel. 1970. Preemergence orientation of *Medetera aldrichii* (Diptera: Dolichopodidae). Ann. Ent. Soc. Amer. 63:913-914.
Fitzgerald, T. D., and W. P. Nagel. 1972. Oviposition and larval bark-surface orientation of *Medetera aldrichii* (Diptera: Dolichopodidae): Response to a prey-liberated terpene. Ann. Ent. Soc. Amer. 65:328-330.
Foote, R. H., J. R. Coulson, and H. Robinson. 1965. Family Dolichopodidae. *In* Stone, A., et al., eds., A catalog of the Diptera of America north of Mexico, p. 482-531. U.S. Dept. Agr. Agr. Handb. 276. Washington, D.C.
Frey, R. 1915. Zur Kenntnis der Dipterenfauna Finlands III: Dolichopodidae. Acta Soc. pro Fauna et Flora Fenn. 40 (5):1-80.
Furniss, M. M., B. H. Baker, R. A. Warner, and L. C. Yarger. 1979. Characteristics of spruce beetle (Coleoptera) infestation on felled white spruce in Alaska. Canad. Ent. 111:1355-1360.
Furniss, M. M., G. E. Daterman, L. N. Kline, and others. 1974. Effectiveness of the Douglas-fir beetle anti-aggregation pheromone methylcyclohexone at three concentrations and spacings around felled host trees. Canad. Ent. 106:381-392.
Gauld, I. D., and L. A. Mound. 1982. Homoplasy and the delineation of holophyletic genera in some insect groups. System. Ent. 7:73-86.
Griffiths, G. C. D. 1972. The phylogenetic classification of Diptera Cyclorrhapha, with special reference to the structure of the male postabdomen. 340 p. W. Junk, The Hague.
Hardy, G. H. 1939. Miscellaneous notes on Australian Diptera VI, Dolichopodinae. Proc. Linn. Soc. N.S. Wales 64:345-352.
Hardy, G. H. 1960. The time element in development of colour on adult Diptera and on that of a cicada (Homoptera). Ent. Monthly Mag. 96:5-7.
Harmston, F. C. 1951. New species of Dolichopodidae from California and Utah (Diptera). Great Basin Nat. 11:11-17.
Harmston, F. C., and G. F. Knowlton. 1941. New western Dolichopodidae (Diptera). J. Kans. Ent. Soc. 14:92-97.
Harmston, F. C., and G. F. Knowlton. 1943. Five new western Dolichopodidae (Diptera). Bull. Brooklyn Ent. Soc. 38:101-107.
Hedström, L. 1962. Sexuellt beteende inöm familijen Dolichopodidae. Ent. Meddel. 32:33-36.
Heppner, J. B., and G. Lamas. 1982. Acronyms for world collections of insects, with an emphasis on Neotropical Lepidoptera. Bull. Ent. Soc. Amer. 28:305-315.
Hollis, D. 1964. Notes and descriptions of Indonesian Dolichopodidae (Insecta, Diptera) in the Zoologisch Museum, Amsterdam. Beaufortia 10:239-274.
Hopping, G. R. 1947. Notes on the seasonal development of *Medetera aldrichii* Wheeler (Diptera: Dolichopodidae) as a predator of the Douglas-fir bark beetle *Dendroctonus pseudotsugae* Hopkins. Canad. Ent. 79:150-153.
Johnsey, R. L., W. P. Nagel, and J. A. Rudinsky. 1965. The Diptera *Medetera aldrichii* Wheeler (Dolichopodidae) and *Lonchaea furnissi* McAlpine (Lonchaeidae) associated with the Douglas-fir beetle in western Oregon and Washington. Canad. Ent. 97:521-527.
Kishi, Y. 1969. A study of the ability of *Medetera* sp. (Diptera: Dolichopodidae) to prey upon the bark and wood boring Coleoptera. Appl. Ent. Zool. 4:177-184.
Kowarz, F. 1877. Die dipteren Gattung *Medeterus* Fischer. Zool.-Bot. Gesell. Wien, Verhandl. 27:39-76.
Krivosheina, N. P. 1974. Larval morphology of the genus *Medeterus* Fisch. (Diptera, Dolichopodidae). Ent. Obozr. 53:309-324. (Ent. Rev. (Wash.) 53:49-59.)
Lindroth, C. H. 1957. The faunal connection between Europe and America. 344 p. J. Wiley and Sons, New York.
Linnaeus, C. 1767. Systema naturae per regna tria naturae. Ed. 12 (rev.), v. 1 (2):533-1327. Stockholm.
Loew, H. 1857. Neue Beiträge zur Kenntnis der Dipteren. Fünfter Beitrag K. Realschule zu Meseritz, Programme 1857, p. 1-56.
Loew, H. 1861. Neue Beiträg zur Kenntnis der Dipteren. Achter Beiträg K. Realschule zu Meseritz, Programme 1861, p. 1-100.
Loew, H. 1864. Monographs of Diptera of North America. Pt. II. Smithsn. Inst. Misc. Collect. 6:1-360.
Lundbeck, W. 1912. Diptera Danica. Pt. IV:Dolichopodidae. G. E. C. Gad, Copenhagen.
McAlpine, J. F. 1981. Morphology and terminology - adults. *In* Manual of Nearctic Diptera, v. 1, p. 9-64. Agr. Canada, Ottawa.
McGherkey, J. H., and W. P. Nagel. 1966. A technique for rearing larvae of *Medetera aldrichii* (Diptera:

Dolichopodidae). Ann. Ent. Soc. Amer. 59:290-292.
Macquart, J. 1827. Insectes Diptères du nord de la France. Platypézines, Dolichopodes, Empides, Hybotines. Soc. des Sci., l'Agr. et des Arts, Lille, Rec. des Trav. 1826/1827:213-291.
Malloch, J. R. 1919. On an undescribed species of *Medeterus* (Diptera: Dolichopodidae). Ent. News 30:7-9.
Matthews, J. V. 1979. Tertiary and Quaternary environments: Historical background for an analysis of the Canadian insect fauna. *In* Danks, K. V., Canada and its insect fauna, p. 31-82. Mem. Ent. Soc. Canada 108, Ottawa.
Meigen, J. W. 1824. Systematische Beschreibung der bekannten europäischen zweiflügeligen Inseckten. V. 4, 428 p. Hamm.
Meigen, J. W. 1838. Systematische Beschreibung der bekannten europäischen zweiflügeligen Inseckten. V. 7, 434 p. Hamm.
Meijere, J. C. H. de. 1916. Studien über südostasiatische Dipteren, XII: Javanische Dolichopodiden und Ephydriden. Tijdschr. v. Ent. 59:225-273.
Meunier, F. 1907. Monographie des Dolichopodidae de l'ambre de la Baltique. Le Naturaliste, Paris, 29:245-246, 260-262.
Mik, J. 1878. Dipterologische Untersuchungen. Jahresber. K. K. Akad. Gymnasium Wein 1878:1-24.
Moser, J. C., R. C. Thatcher, and L. S. Packard. 1971. Relative abundance of southern pine beetle associates in east Texas. Ann. Ent. Soc. Amer. 64:72-77.
Nagel, W. P., and T. D. Fitzgerald. 1975. *Medetera aldrichii* larval feeding behavior and prey consumption. (Dipt.: Dolichopodidae). Entomophaga 20:121-127.
Negrobov, O. P. 1966. Revision of the Palearctic species of *Medetera* Fisch. (Diptera, Dolichopodidae). Pt. 1: *Oligochaetus* Mik. Ent. Obozr. 45:874-896. (Ent. Rev. (Wash.) 45:491-503.)
Negrobov, O. P. 1967. New Palearctic species of the subfamily Medeterinae (Diptera, Dolichopodidae). Ent. Obozr. 46:890-908. (Ent. Rev. (Wash.) 46:533-544.)
Negrobov, O. P. 1971-77. Dolichopodidae, Unterfamilie Medeterinae. *In* Lindner, E., ed., Die Fliegen der palaearktischen Region 29:269-353, lf. 284 (1971); lf. 289 (1972); lf. 302 (1974); lf. 303 (1974); lf. 316 (1977). Schweizerbart, Stuttgart.
Negrobov, O. P., and A. A. Stackelberg. 1971. Der Bau der Genitalien bei den Dolichopodidae. *In* Lindner, E., ed., Die Fliegen der palaearktischen Region 29:238-242, lf. 284. Schweizerbart, Stuttgart.
Negrobov, O. P., and E. Thuneberg. 1970. Some questions on the systematics of the genus *Medetera* (Dipt., Dolichopodidae) of the Palearctic Region. Ann. Ent. Fenn. 36:143-145.
Negrobov, O. P., P. Vanschuytbroeck, and I. J. Gritchanov. 1981. The species of the genus *Saccopheronta* (Diptera: Dolichopodidae). Bull. Inst. Roy. Sci. Nat. Belge 53 (4):1-11.
Nuorteva, M. 1956. Über den Fichtenstammen-Bastkafer *Hylurgops palliatus* Gyrll., und seine Insecktenfeinde. Acta Ent. Fenn. 13:1-118.
Nuorteva, M. 1959. Untersuchungen über einige in dem Frassbildern der Borkenkafer lebende *Medetera* Arten (Dipt., Dolichopodidae). Ann. Ent. Soc. Fenn. 25:192-210.
Overgaard, N. A. 1968. Insects associated with the southern pine beetle in Texas, Louisiana, and Mississippi. J. Econ. Ent. 61:1197-1201.
Parent, O. 1925. Contribution à la fauna diptérologique d'Égypt. Bull. Soc. Roy. Ent. d'Égypte 9:153-185.
Parent, O. 1927. Contribution à l'étude des especes paléarctiques du genre *Medetera* Fischer, sensu stricto (Diptères, Dolichopodidae). Ann. Soc. Sci. de Bruxelles (B) 47:1-26.
Parent, O. 1929. Étude sur les Dolichopodides exotiques de la collection von Roder. Ann. Soc. Sci. de Bruxelles (B) 49:169-246.
Parent, O. 1932. Contribution à la faune diptérologique (Dolichopodidae) d'Australie-Tasmanie. Ann. Soc. Sci. de Bruxelles (B) 52:105-176.
Parent, O. 1933. Étude monographique sur les Diptères Dolichopodides de Nouvelle Zelande. Ann. Soc. Sci. de Bruxelles (B) 53:323-441.
Parent, O. 1935. Diptères Dolichopodides du Congo belge. Nouvelle contribution. Rev. de Zool. et de Bot. Africaines 27:112-129.
Parent, O. 1938. Diptères Dolichopodidae. Fauna France 35:1-720.
Powell, J. A. 1976. A remarkable new genus of brachypterous moth from coastal sand dunes in California (Lepidoptera: Gelechioidea, Scythrididae). Ann. Ent. Soc. Amer. 69:325-339.
Robinson, H. 1964a. A synopsis of the Dolichopodidae (Diptera) of the southeastern United States and adjacent regions. Misc. Publ. Ent. Soc. Amer. 4:103-192.
Robinson, H. 1964b. Two new genera of Dolichopodidae from Mexico. Proc. Ent. Soc. Wash. 66:245-252.
Robinson, H. 1967. New species of Dolichopodidae from the United States and Mexico. Proc. Ent. Soc. Wash. 69:114-127.
Robinson, H. 1970a. The subfamilies of the family Dolichopodidae in North and South America (Diptera). Papeis Dept. Zool. São Paulo 23 (6):53-62.
Robinson, H. 1970b. Family Dolichopodidae. *In* Papavero, N., ed., A catalogue of the Diptera of the Americas south of the United States. Pt. 40, p. 1-92. Mus. Zool. Univ. São Paulo, Brasil.

Robinson, H. 1975. Bredin-Archbold-Smithsonian biological survey of Dominica. The family Dolichopodidae with some related Antillean and Panamanian species. Smithsn. Inst. Contrib. Zool. 185:1-141.

Robinson, H., and J. R. Vockeroth. 1981. Dolichopodidae. *In* Manual of Nearctic Diptera, v. 1, p. 625-639. Agr. Canada, Ottawa.

Schmid, J. M. 1970-71. *Medetera aldrichii* (Diptera: Dolichopodidae) in the Black Hills. I. Emergence and behavior of adults. II. Biology and densities of the immature stages. Canad. Ent. 102:705-713; 103:848-853.

Schmitschek, E. 1930. Der achtzahnige Larchenborkenkafer *Ips cembrae* Heer. Ztschr. f. Angew. Ent. 17:255-260.

Stephen, F. M., and D. L. Dahlsten. 1976. The arrival sequence of the arthropod complex following attack by *Dendroctonus brevicornis* (Coleoptera: Scolytidae) in ponderosa pine. Canad. Ent. 108:283-304.

Steyskal, G. C. 1967. Replacement names for preoccupied specific names in Dolichopodidae (Diptera). Proc. Ent. Soc. Wash. 69:224.

Svihra, P. 1972. Survey of the seasonal flight pattern of *Ips typographus* L. with an attractant trap in Slovakia. Ztschr. f. Angew. Ent. 72:80-92.

Thuneberg, E. 1955. A revision of the Palearctic species of the genus *Medetera* Fischer (Dipt., Dolichopodidae). Ann. Ent. Fenn. 21:130-157.

Ulrich, H. 1971. Zur Skelett- und Muskelanatomie des Thorax der Dolichopodiden und Empididen (Diptera). Veröffentl. Zool. Staatssamml. München. 15:1-44.

Ulrich, H. 1974. Das Hypopygium der Dolichopodidae (Diptera): Homologie und Grundplanmerkmale. Bonn. Zool. Monog. 5:1-60.

Ulrich, H. 1977. Abwandlungen im Bau des Dolichopodiden-Hypopygiums (Diptera) - I: *Medetera truncorum* Meigen. Bonn. Zool. Beitr. 28:412-420.

Ulrich, H. 1981. Zur systematischen Gleiderung der Dolichopodiden (Diptera). Bonn. Zool. Beitr. 31:385-402.

Van Duzee, M. C. 1914. New species of North American Dolichopodidae (Diptera). Ent. News 25:433-443.

Van Duzee, M. C. 1919. Key to the North American species of the dipterous genus *Medeterus* with descriptions of new species. Proc. Calif. Acad. Sci., ser. 4, 8:241-263.

Van Duzee, M. C. 1923. Scientific results of the Katmai Expedition of the National Geographic Society: Diptera of the family Dolichopodidae. Ohio J. Sci. 23:241-263.

Van Duzee, M. C. 1924. New Canadian Dolichopodidae (Diptera). Canad. Ent. 56:244-249.

Van Duzee, M. C. 1925. New species of North American Dolichopodidae (Diptera). Psyche 32:178-189.

Van Duzee, M. C. 1928a. Three new dolichopodids from western Canada (Dipt.). Canad. Ent. 60:40-42.

Van Duzee, M. C. 1928b. Table of the North American species of *Medeterus,* with descriptions of three new forms. Psyche 35:36-43.

Van Duzee, M. C. 1930. Dolichopodidae. Pt. 5 (1). *In* Diptera of Patagonia and south Chile. Brit. Mus. (Nat. Hist.), London.

Van Duzee, M. C. 1932. New species of Dolichopodidae from North America and Cuba, with notes on known species. Amer. Mus. Novitates 521:1-14.

Van Duzee, M. C. 1933a. New American Dolichopodidae. Amer. Mus. Novitates 655:1-20.

Van Duzee, M. C. 1933b. Preoccupied names of dolichopodid flies and new names proposed for the species. Ent. News 4:151-152.

Wheeler, W. M. 1899. New species of Dolichopodidae from the United States. Proc. Calif. Acad. Sci. (3) 2:1-84 (Zool.).

Wiley, E. O. 1981. Phylogenetics: The theory and practice of phylogenetic systematics. 439 p. John Wiley and Sons, New York.

Williamson, D. L. 1971. Olfactory discernment of prey by *Medetera bistriata.* Ann. Ent. Soc. Amer. 64:586-589.

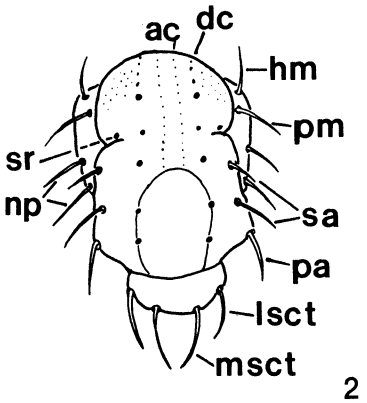
Williamson, D. L., and J. P. Vite. 1971. Impact of insecticidal control on the southern pine beetle population in east Texas. J. Econ. Ent. 64:1440-1444.

Wood, D. L. 1982. The roles of pheromones, kairomones, and allomones in the host selection behavior and colonization behavior of bark beetles. Ann. Rev. Ent. 27:411-446.

Zetterstedt, J. W. 1843. Diptera Scandinaviae. V. 2, p. 441-894. Lund.

Figure 1.—*Medetera bistriata,* male, habitus, left lateral.

Figures 2-6.—*Medetera:* 2, Thoracic chaetotaxy, dorsal: ac, acrostichals; dc, dorsocentrals; hm, postpronotals; lsct, lateral scutellars; msct, median scutellars; np, notopleurals; pa, postalars; pm, presutural supraalars; sa, postsutural supraalars; sr, presutural intraalars. 3-6, Thorax, left lateral view of *Medetera* species: 3, *petulca;* 4, *aldrichii;* 5, *apicalis;* 6, *vittata.*



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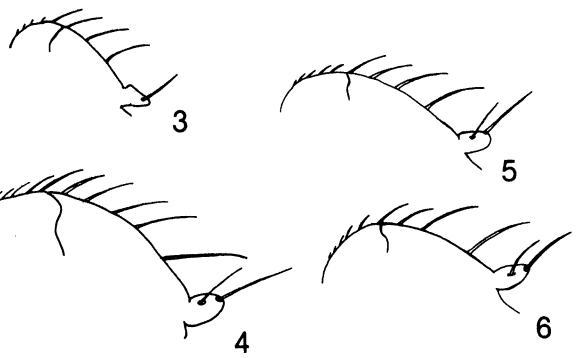
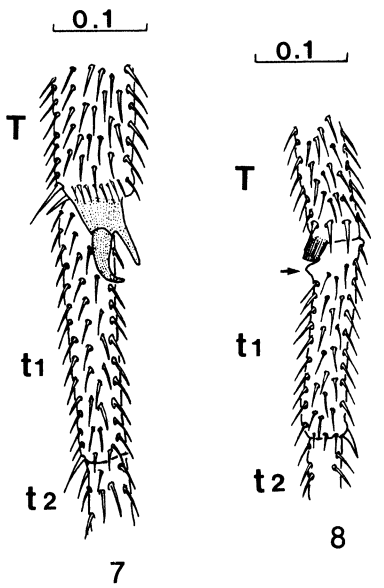


Figures 7-9.—7, Left leg III, anterior view, *Medetera petulca,* male: T, tibia; t, tarsomere. 8, Right leg III, anterior view, *Medetera vittata,* male. 9, Right wing, *Medetera.*



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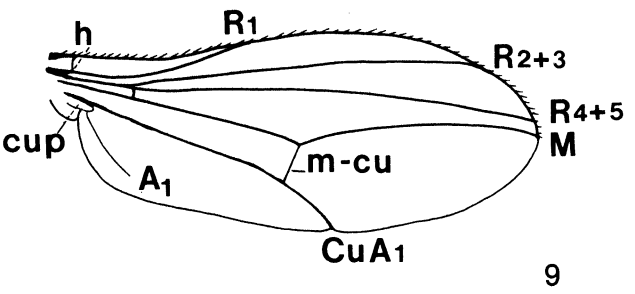

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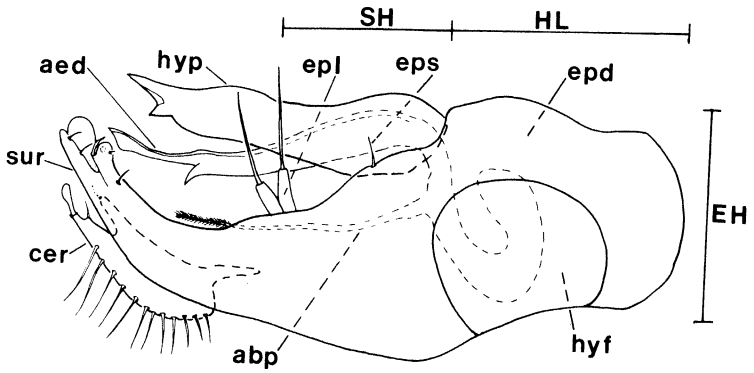
Figure 10.—Hypopygium, left lateral, *Medetera aldrichii:* abp, "bottle-brushlike" aedeagal projection; aed, aedeagus; cer, cercus; epd, epandrium; epl, epandrial lobe; eps, epandrial seta; hyf, hypopygial foramen; hyp, hypandrium; sur, surstylus; EH, epandrial height; HL, length from base of hypandrium to margin of epandrium; SH, length from epandrial lobe to base of hypandrium.



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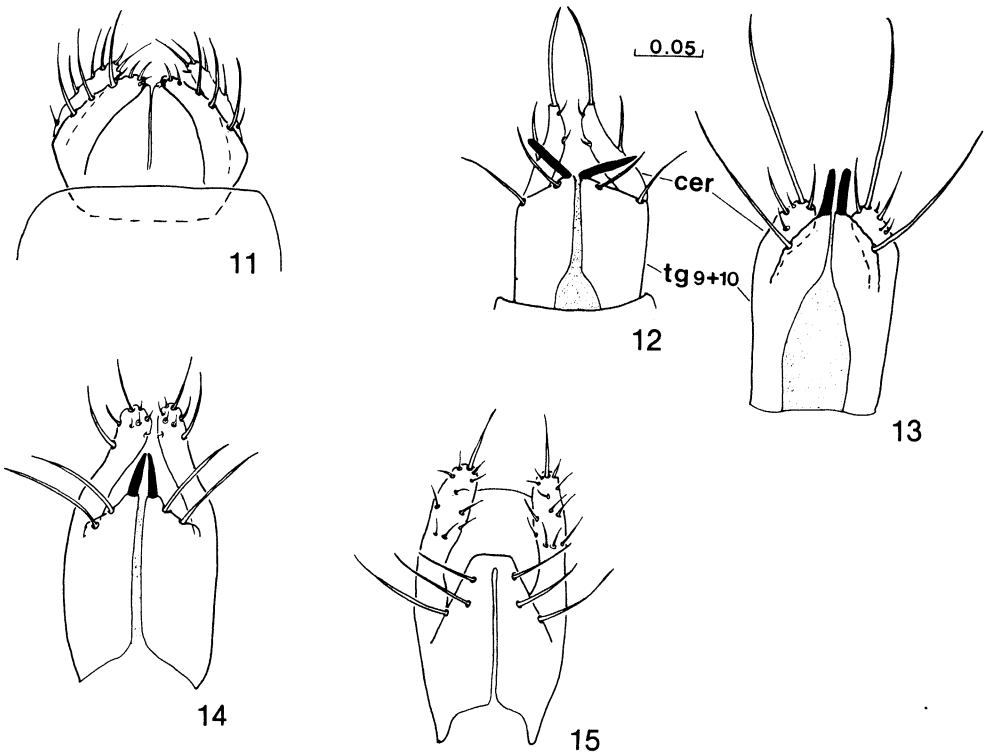
Figures 11-15.—Female terminalia, dorsal view, of *Medetera* species: 11, *nova;* 12, *aeneiventris;* 13, *bistriata;* 14, *apicalis;* 15, *vockerothi.* (cer, cercus; tg 9 + 10, fused terga 9 and 10.)



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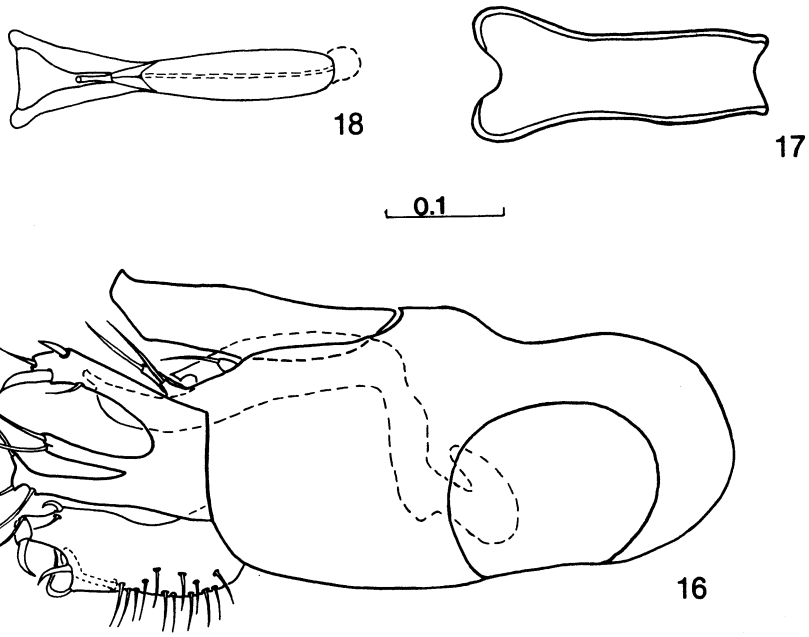
Figures 16-19.—*Medetera nova,* Bethesda, Md.: 16, Hypopygium, left lateral; 17, hypandrium, ventral; 18, aedeagus, ventral; 19, hypopygium, dorsal.



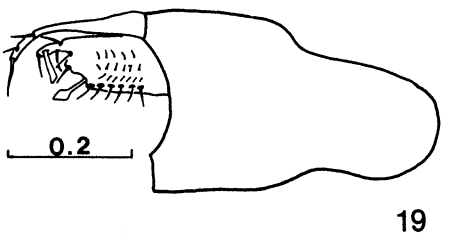
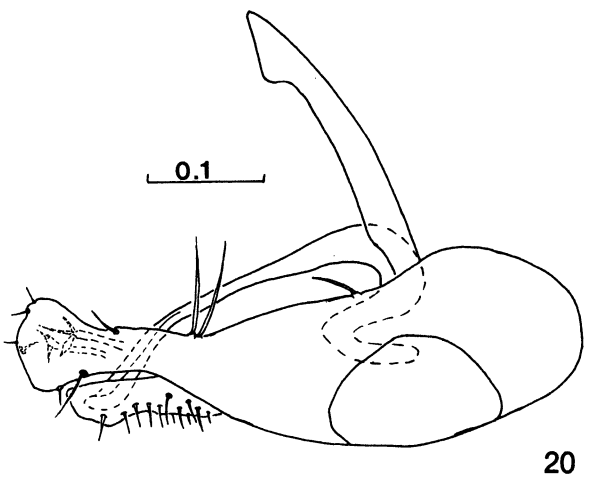
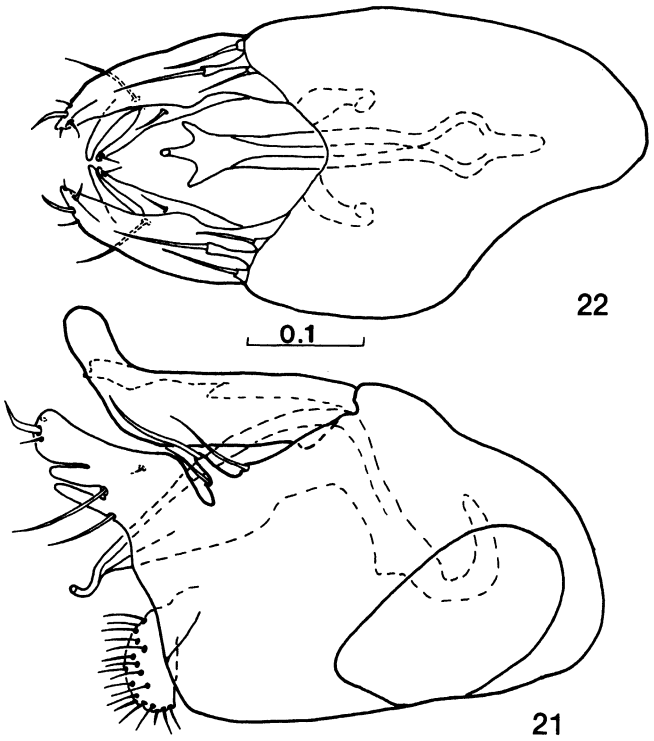
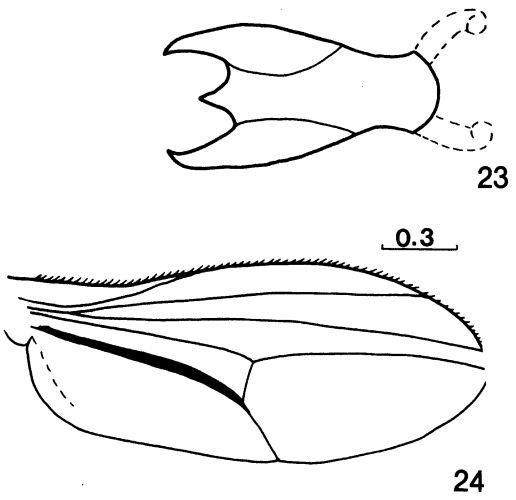


Figure 20.—*Medetera isobellae,* Lincoln, Mass.: Hypopygium, left lateral.

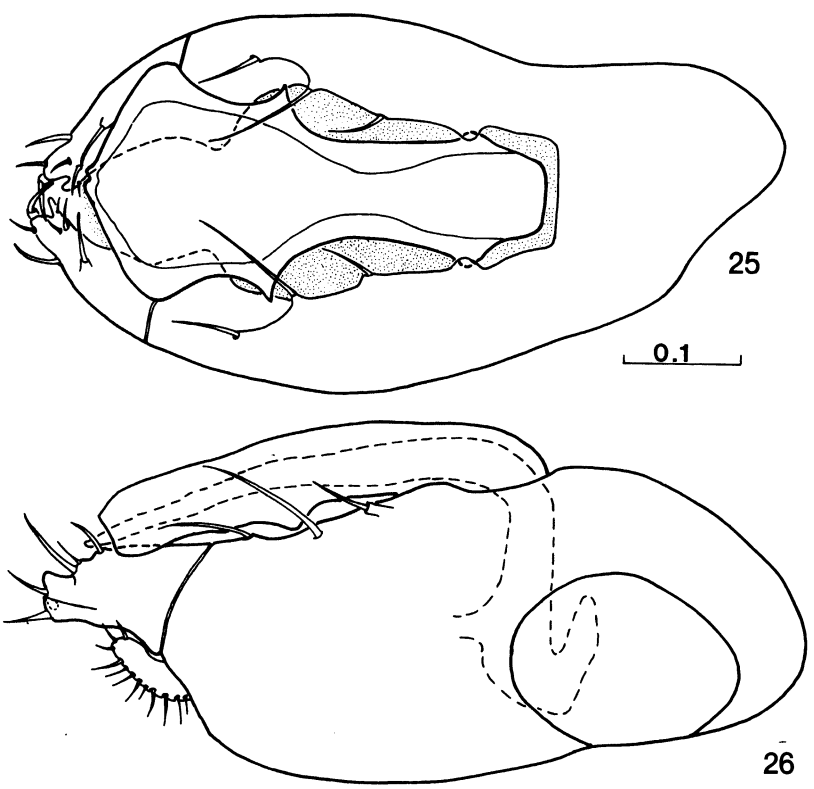


Figures 21-24.—*Medetera alpina,* Alpine Lake, Calif.: 21, Hypopygium, left lateral; 22, hypopygium, ventral, hypandrium removed; 23, hypandrium, ventral; 24, right wing, male, dorsal.

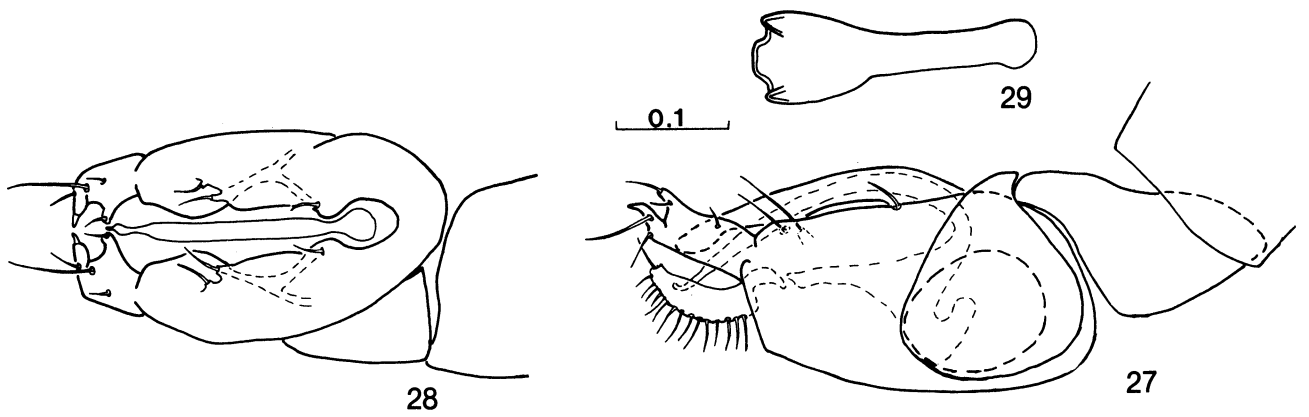




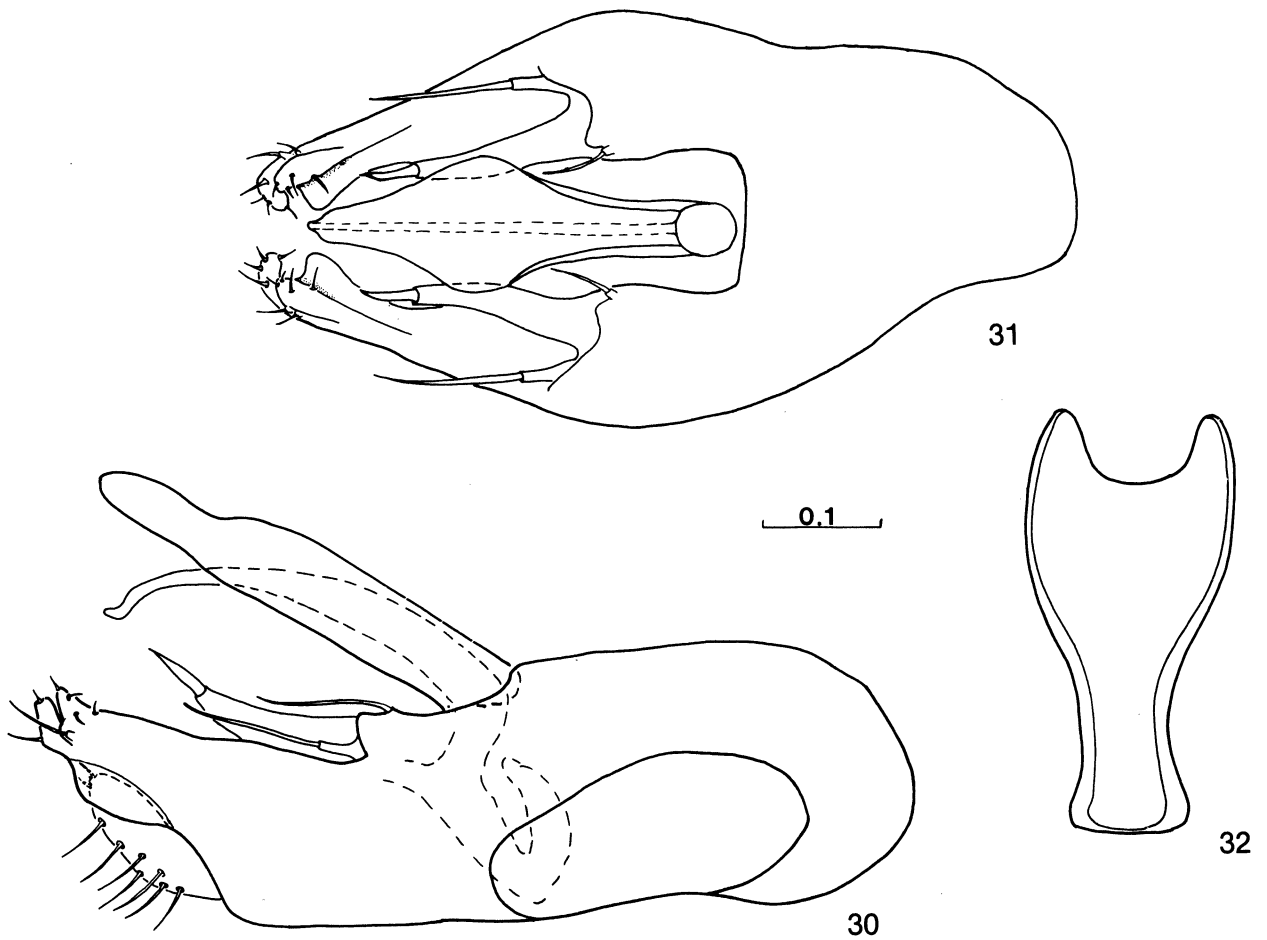
Figures 25-26.—*Medetera potomac,* Washington, D.C.: 25, Hypopygium, left lateral; 26, hypopygium, ventral.



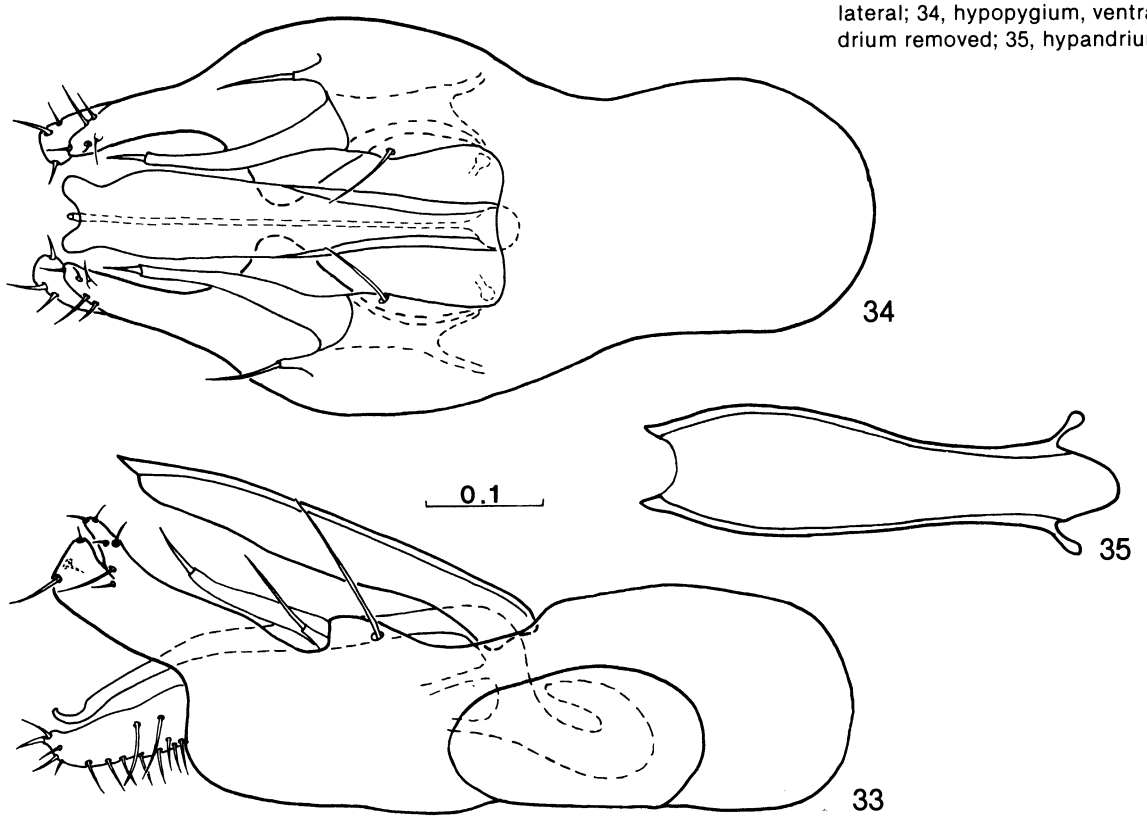
Figures 27-29.—*Medetera postminima,* Marin Co., Calif.: 27, Hypopygium, left lateral; 28, hypopygium, ventral, hypandrium removed; 29, hypandrium, ventral.



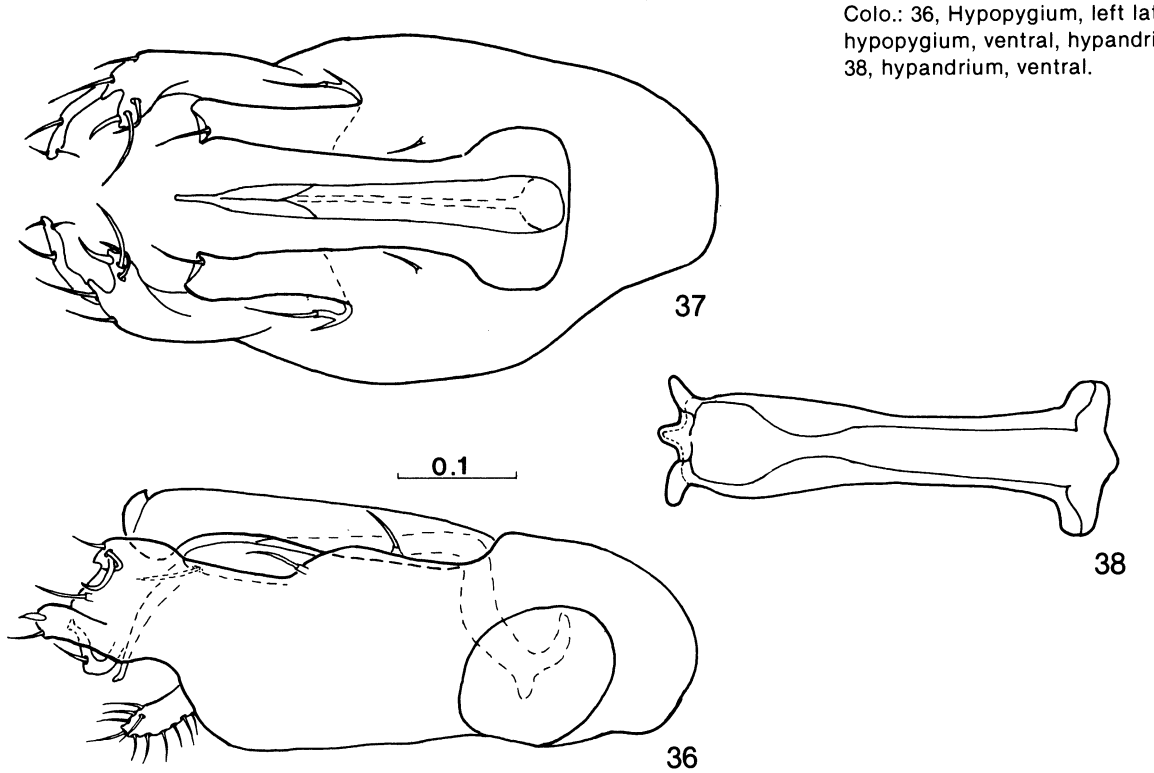
Figures 30-32.—*Medetera petulca,* Asotin, Wash.: 30, Hypopygium, left lateral; 31, hypopygium, ventral, hypandrium removed; 32, hypandrium, ventral.



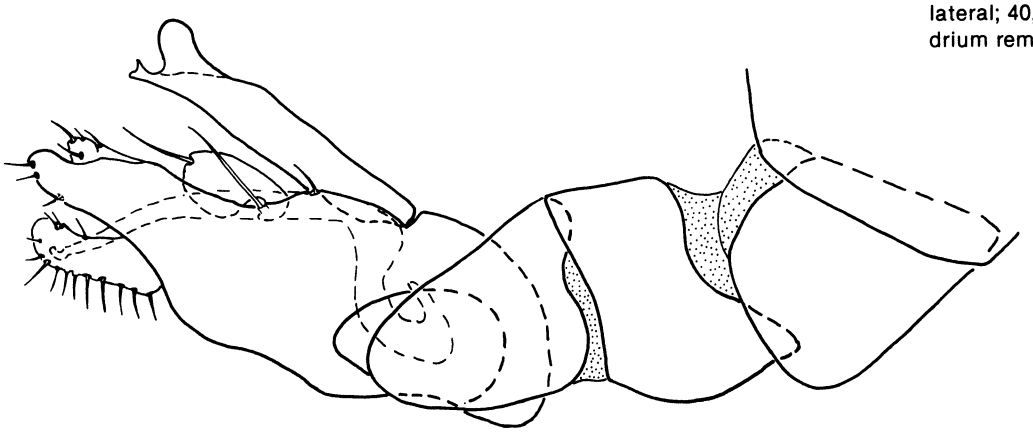
Figures 33-35.—*Medetera similis,* Los Angeles, Calif.: 33, Hypopygium, left lateral; 34, hypopygium, ventral, hypandrium removed; 35, hypandrium, ventral.



Figures 36-38.—*Medetera platythrix,* Boulder, Colo.: 36, Hypopygium, left lateral; 37, hypopygium, ventral, hypandrium removed; 38, hypandrium, ventral.



Figures 39-41.—*Medetera physothrix*, Santa Cruz Co., Calif.: 39, Hypopygium, left lateral; 40, hypopygium, ventral, hypandrium removed; 41, hypandrium, ventral.



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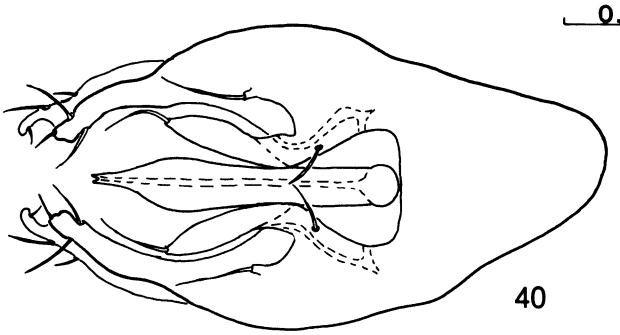

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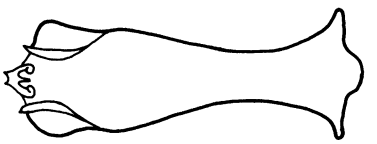

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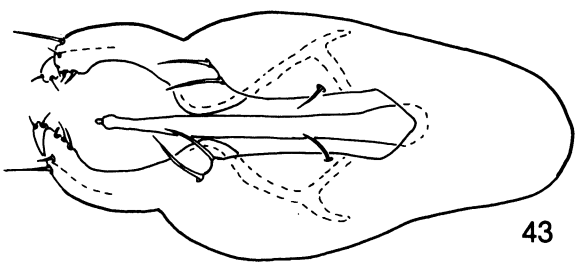
Figures 42-44.—*Medetera aequalis*, San Diego, Calif.: 42, Hypopygium, left lateral; 43, hypopygium, ventral, hypandrium removed; 44, hypandrium, ventral.



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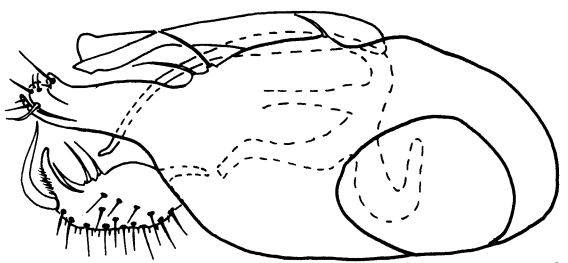

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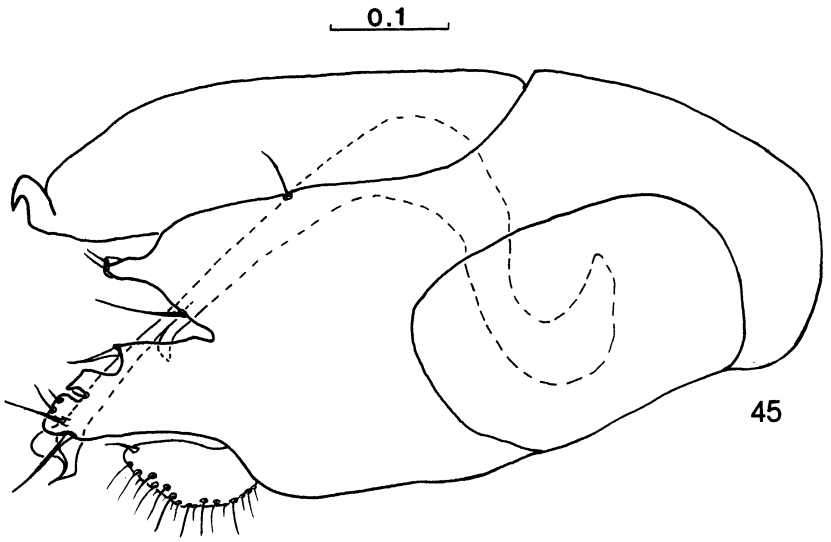
Figures 45-46.—*Medetera utahensis,* Cache Co., Utah: 45, Hypopygium, left lateral; 46, hypandrium, ventral.



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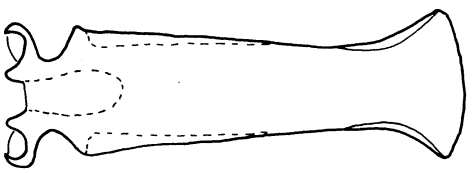

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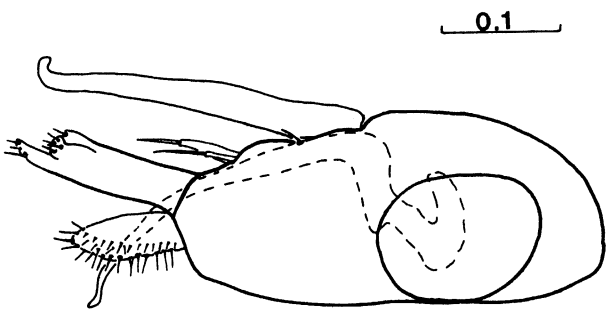
Figures 47-48.—*Medetera xerophila,* Monterey Co., Calif.: 47, Hypopygium, left lateral; 48, hypopygium, ventral.



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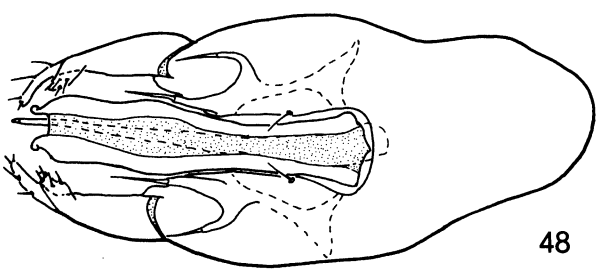

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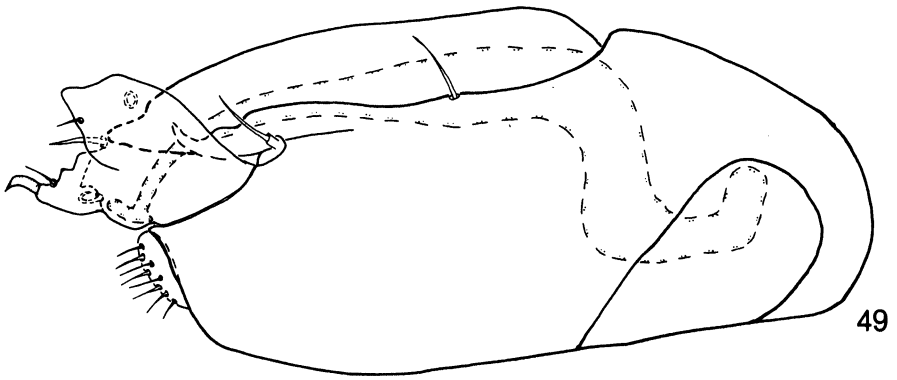
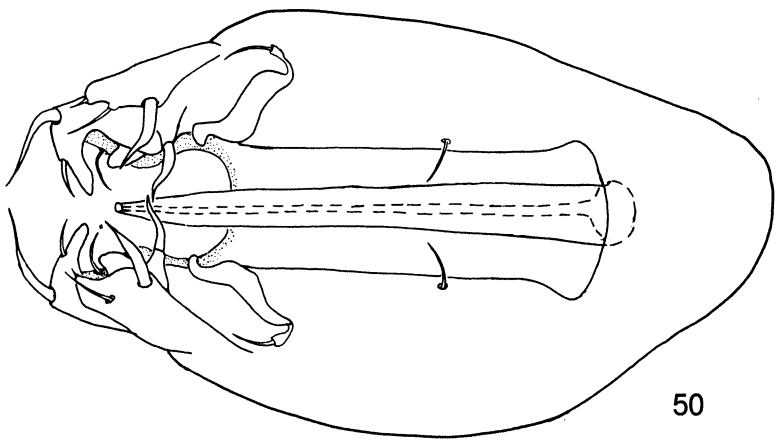
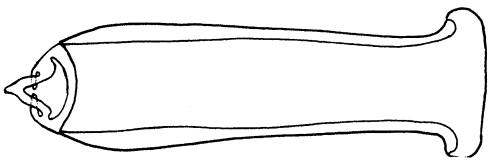
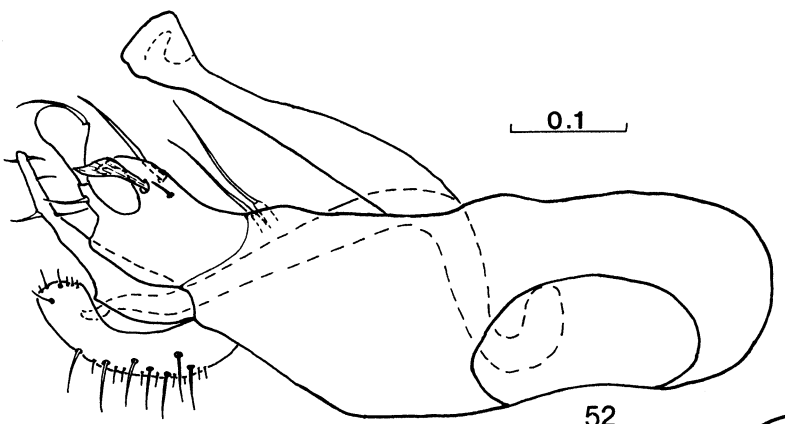
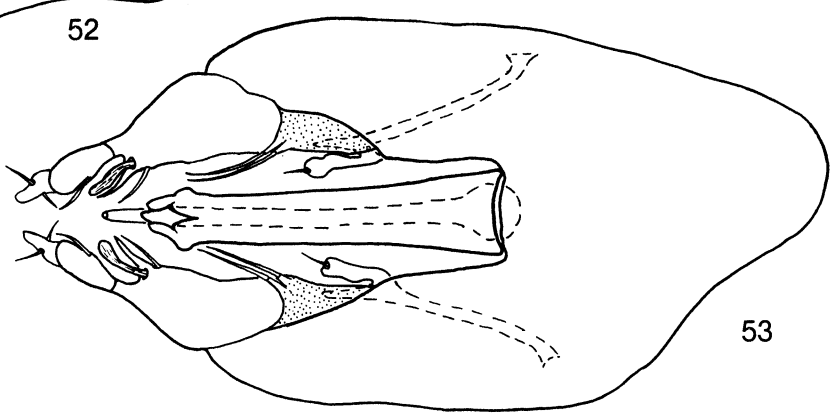


Figures 49–51.—*Medetera falcata*, Fresno, Calif.: 49, Hypopygium, left lateral; 50, hypopygium, ventral, hypandrium removed; 51, hypandrium, ventral.



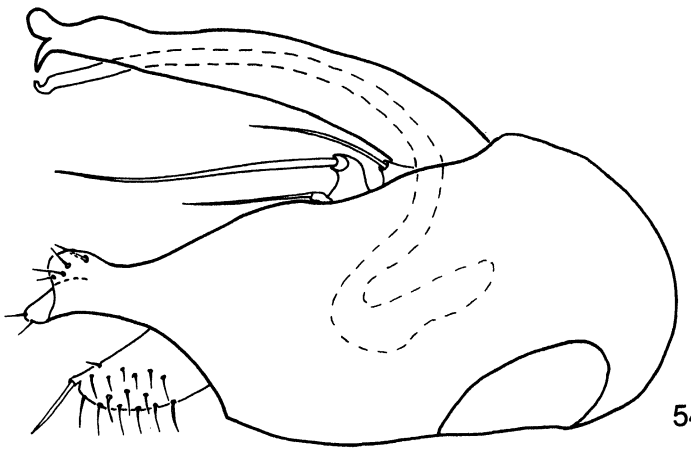






Figures 52–53.—*Medetera aeneiventris*, St. Lawrence Islands, Ontario: 52, Hypopygium, left lateral; 53, hypopygium, ventral.

Figures 54-56.—*Medetera dorycondylus,* Penticton, British Columbia: 54, Hypopygium, left lateral; 55, hypopygium, ventral, hypandrium removed; 56, hypandrium, ventral.



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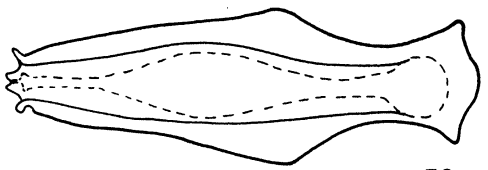

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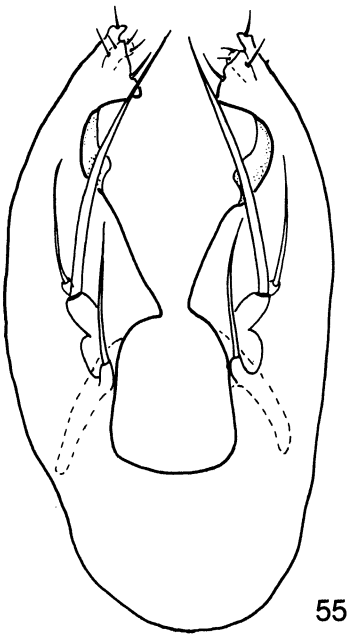

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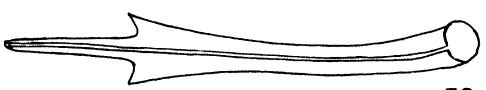
Figures 57-60.—*Medetera signaticornis,* Laniel, Quebec: 57, Hypopygium, left lateral; 58, hypandrium, ventral; 59, aedeagus, ventral; 60, aedeagus, ventral, Indiana Dunes, Ind.



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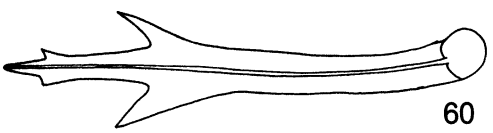

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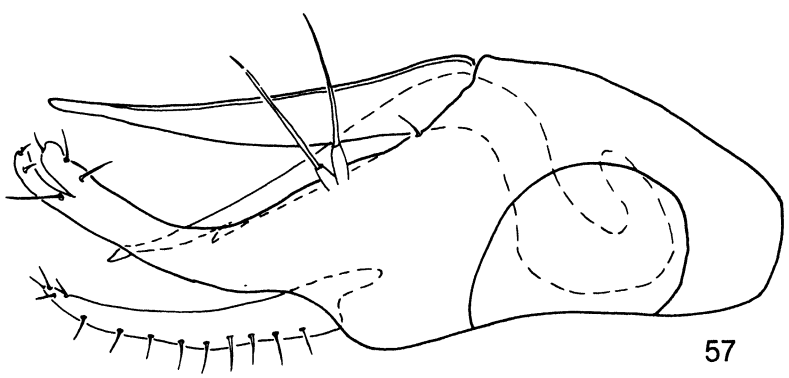

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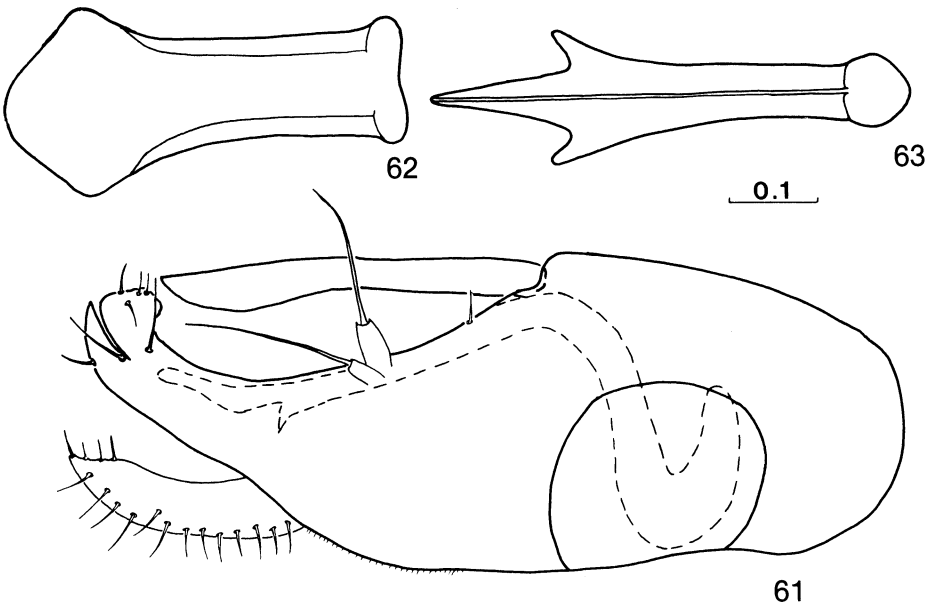
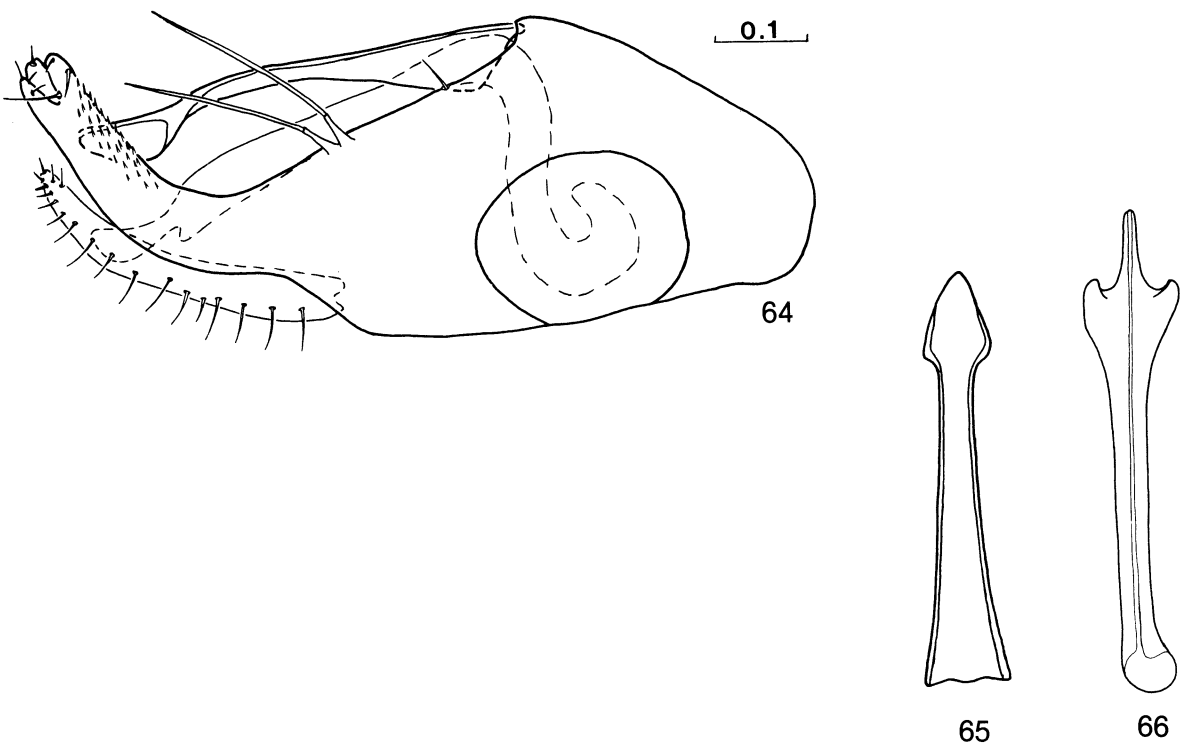
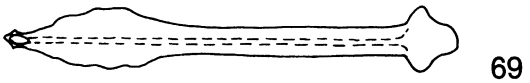
Figures 61-63.—*Medetera subsignaticornis,* Bethlehem, N.H.: 61, Hypopygium, left lateral; 62, hypandrium, ventral; 63, aedeagus, ventral.



Figures 64-66.—*Medetera bistriata,* Clarke Co., Ga.: 64, Hypopygium, left lateral; 65, hypandrium, ventral; 66, aedeagus, ventral.





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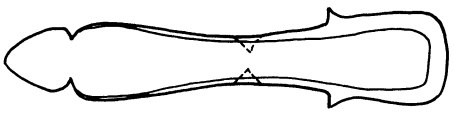

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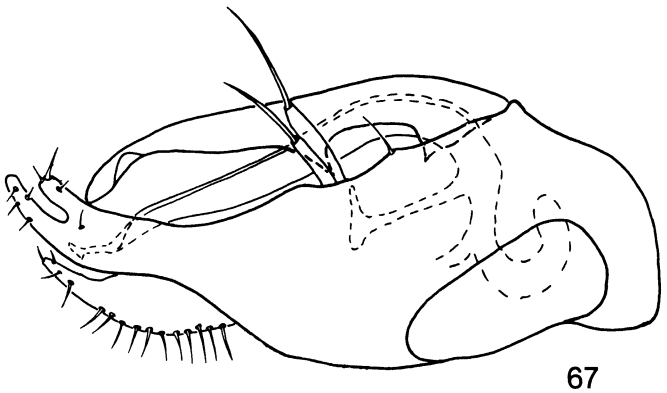

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Figures 67-71.—*Medetera flinflon,* Flin Flon, Manitoba: 67, Hypopygium, left lateral; 68, hypandrium, ventral; 69, aedeagus, ventral; 70, hypandrium, left lateral; 71, hypandrium, left lateral, Invermere, British Columbia.

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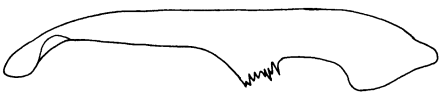

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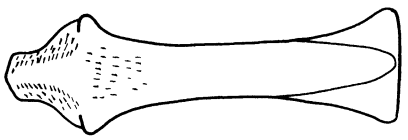

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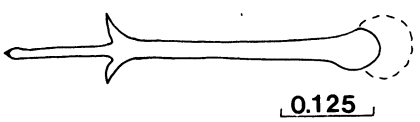

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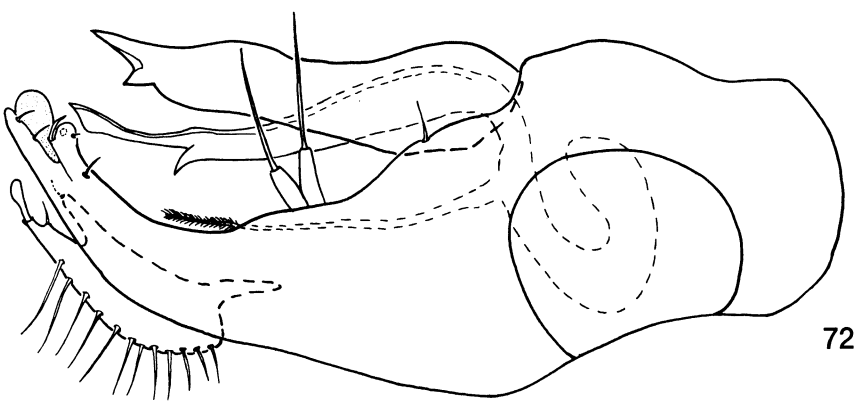

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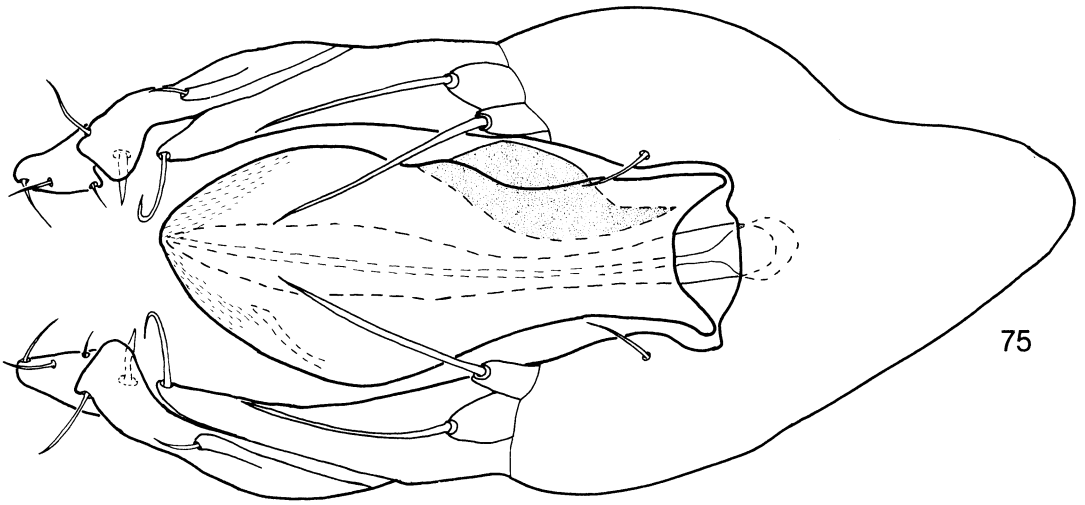
Figures 72-74.—*Medetera aldrichii,* Black Hills, S. Dak.: 72, Hypopygium, left lateral; 73, hypandrium, ventral; 74, aedeagus, ventral.

Figures 75-76.—*Medetera pinicola,* Cedar Falls, Wash.: 75, Hypopygium, ventral; 76, hypopygium, left lateral.



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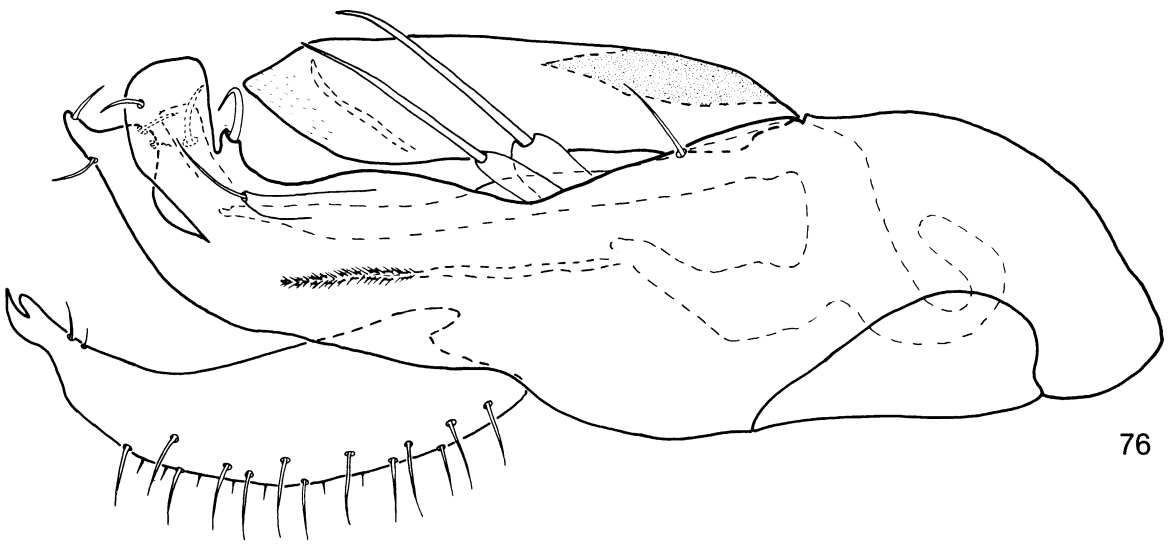
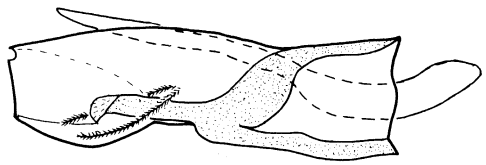


76

Figures 77-81.—*Medetera maura,* Mt. Washington, N.H.: 77, Hypopygium, left lateral; 78, hypandrium and aedeagus, ventral. *M. gaspensis,* Gaspé, Quebec: 79, Hypandrium, ventral; 80, hypandrium, left lateral; 81, aedeagus, left lateral.



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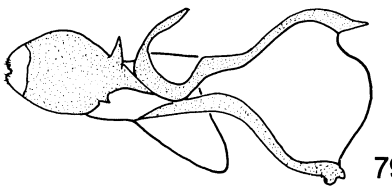

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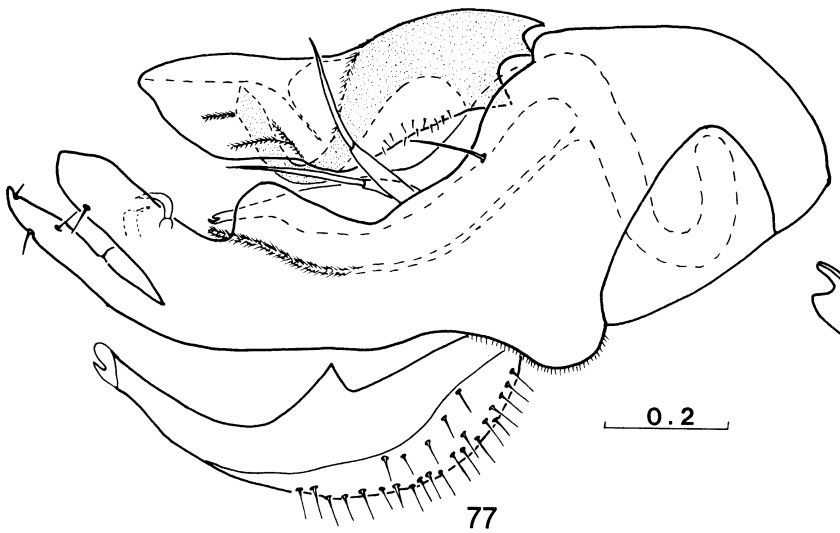

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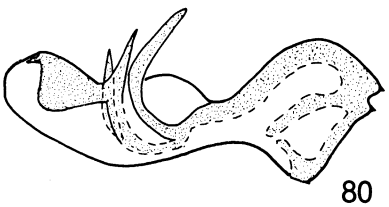

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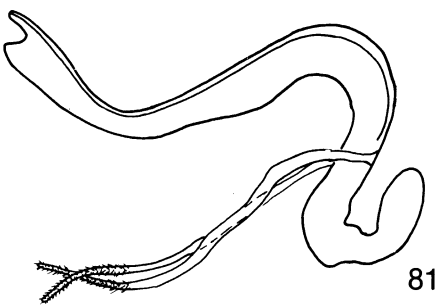

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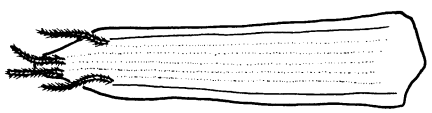
Figures 82-84.—*Medetera vidua,* Low Bush, Ontario: 82, Hypopygium, left lateral; 83, hypandrium, ventral; 84, aedeagus, ventral.



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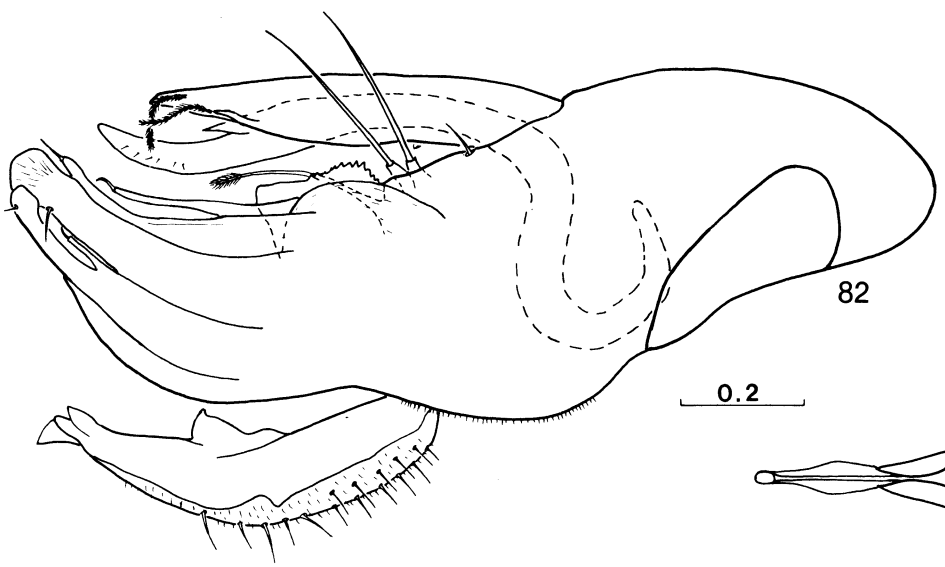

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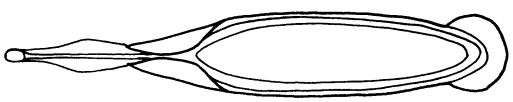
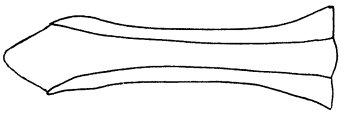


84

Figures 85-86.—*Medetera neomelancholia,* Algoma District, Ontario: 85, Hypopygium, left lateral; 86, hypandrium, ventral.



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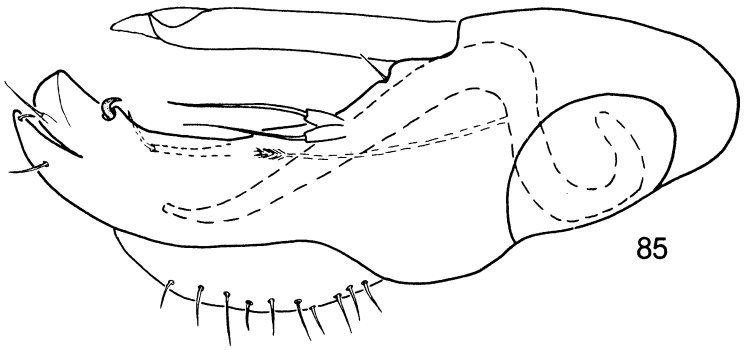
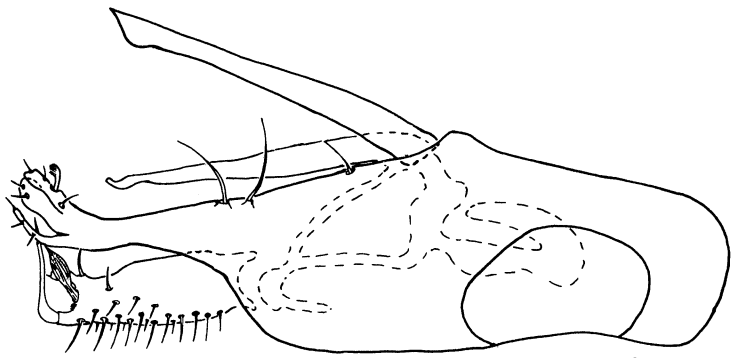


85

Figures 87-92.—*Medetera apicalis,* Moscow, Idaho: 87, Hypopygium, left lateral; 88, hypopygium, ventral; 89, aedeagus, ventral; 90, cerci and surstyli, left lateral, Katmai, Alaska; 91, cerci, left lateral, Cache, Co., Utah; 92, cerci, left lateral, Ithaca, N.Y.



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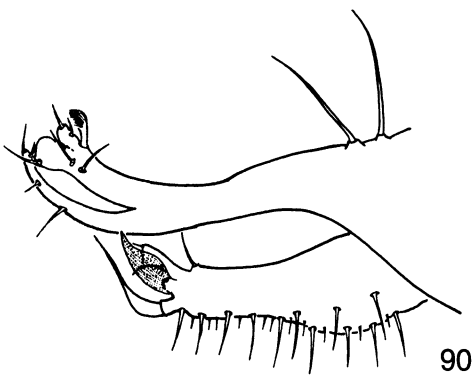

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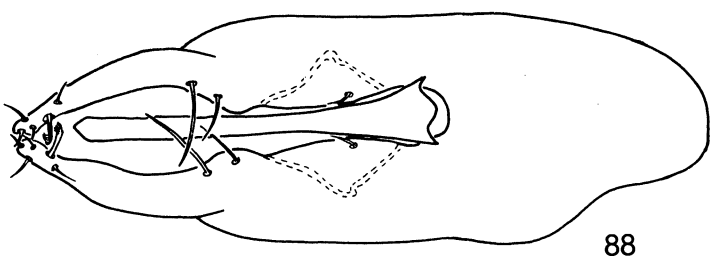

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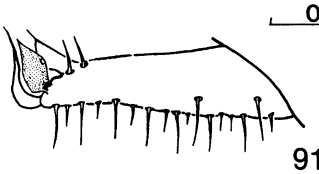

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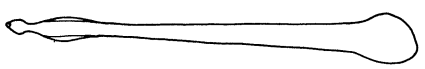

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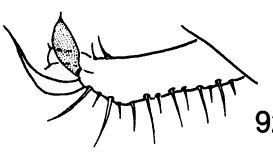
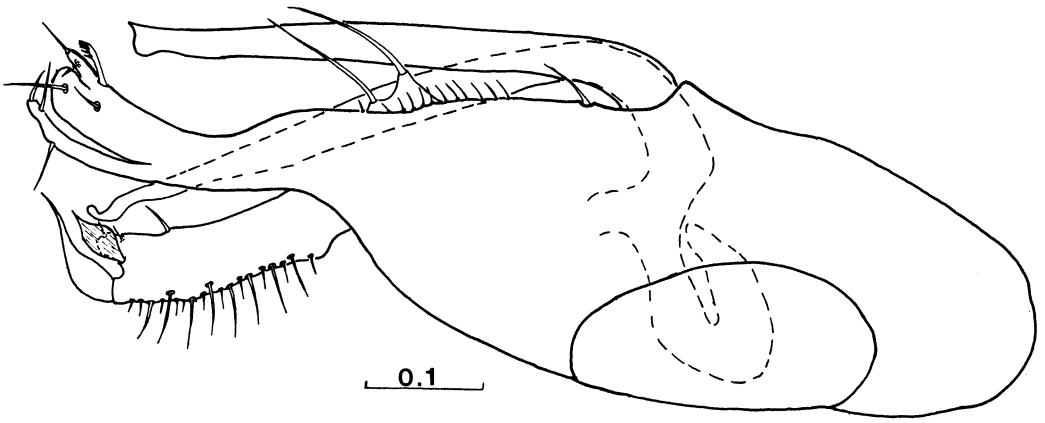


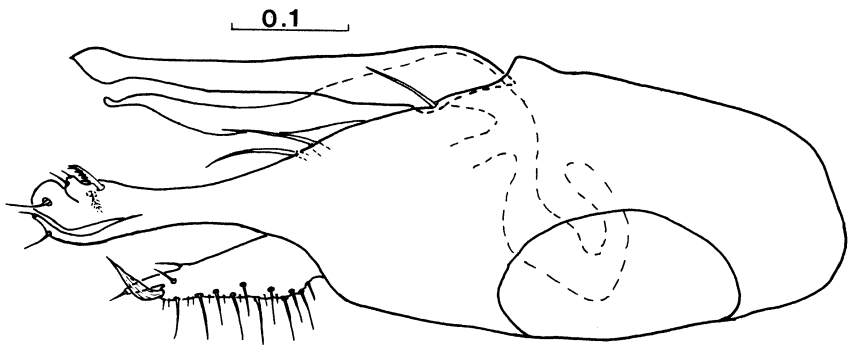
92

Figure 93.—*Medetera saguaroicola*, Saguaro National Monument, Ariz.: Hypopygium, left lateral.



93

Figures 94-95.—*Medetera pseudosibirica*, Laniel, Quebec: 94, Hypopygium, left lateral; 95, hypandrium, ventral.



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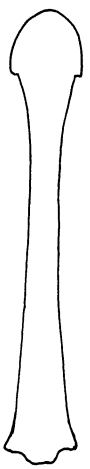

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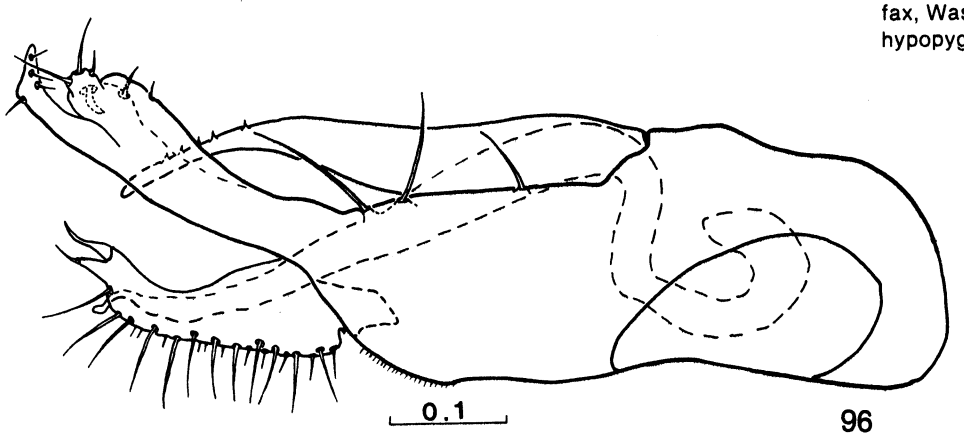
Figures 96-98.—*Medetera cyanogaster,* Colfax, Wash.: 96, Hypopygium, left lateral; 97, hypopygium, ventral; 98, aedeagus, ventral.



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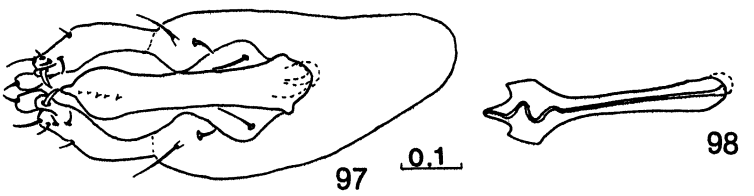

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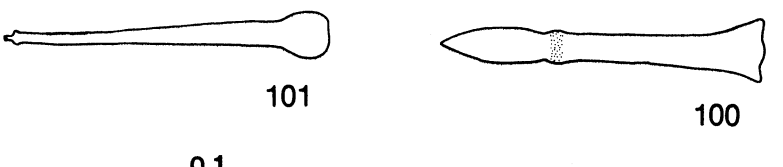
Figures 99-101.—*Medetera furcata,* Nassau Co., N.Y.: 99, Hypopygium, left lateral; 100, hypandrium, ventral; 101, aedeagus, ventral.



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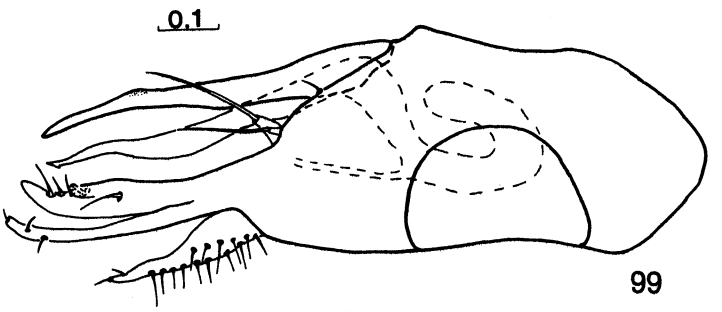

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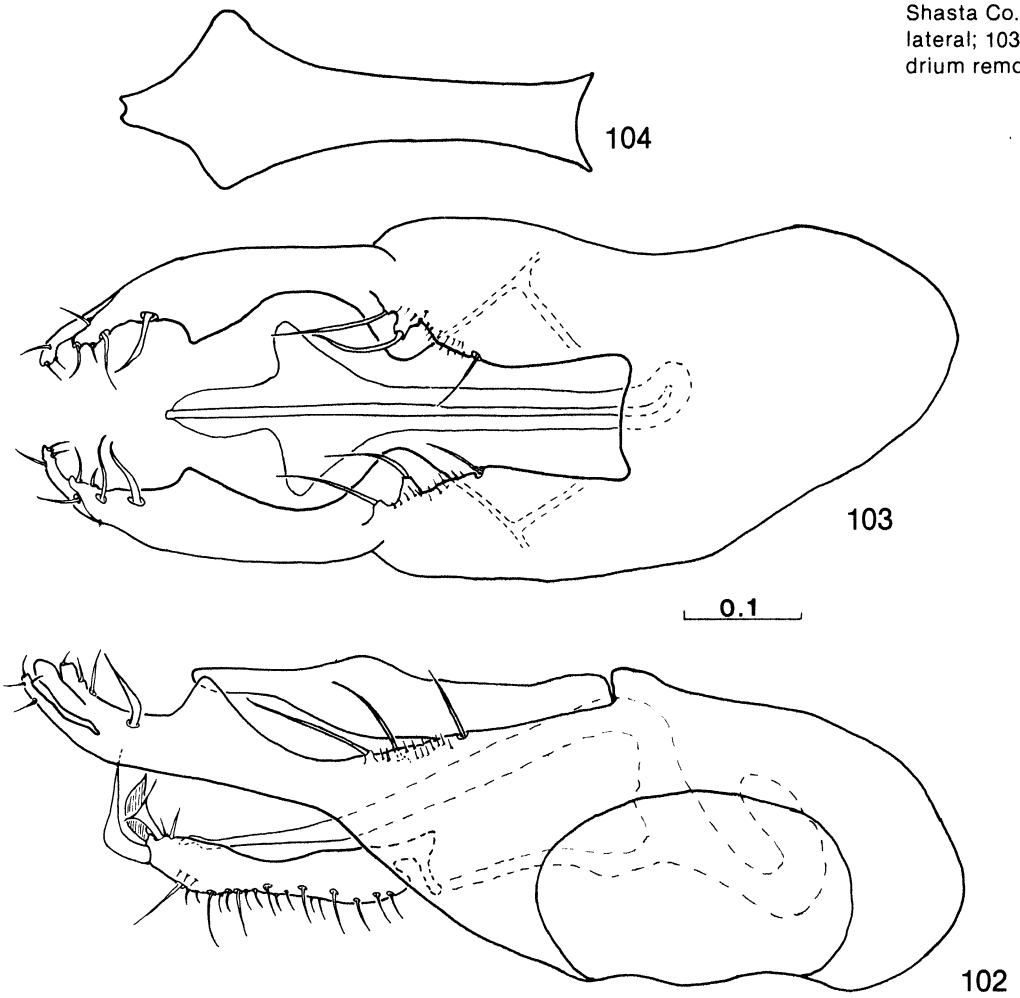
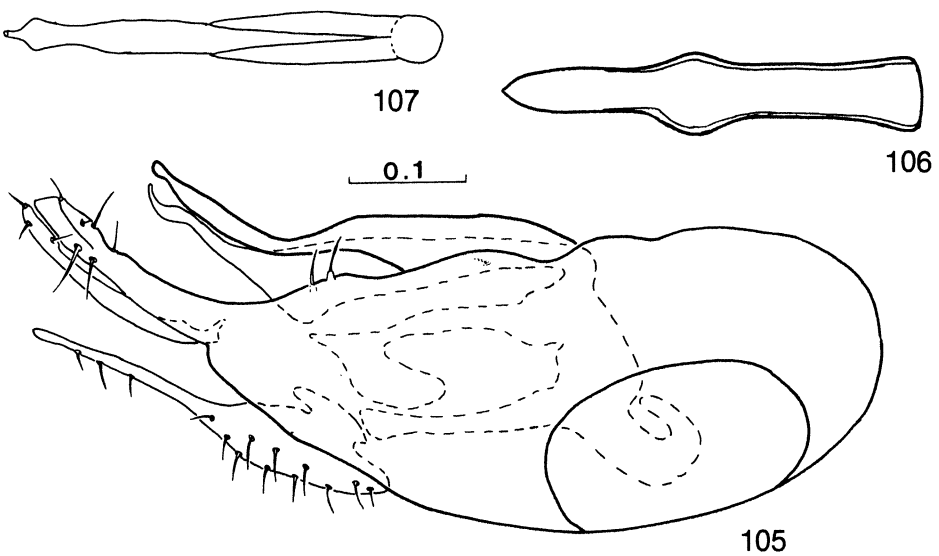
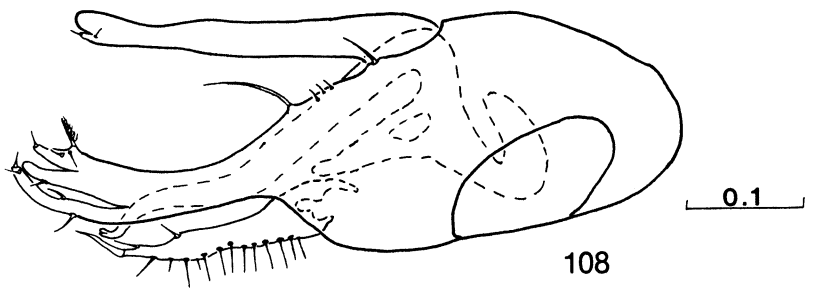
Figures 102-104.—*Medetera longinervis*, Shasta Co., Calif.: 102, Hypopygium, left lateral; 103, hypopygium, ventral, hypandrium removed; 104, hypandrium, ventral.



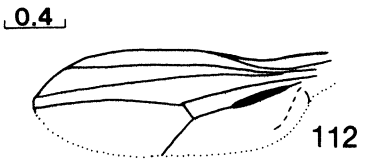
Figures 105-107.—*Medetera crassivenis*, Colesville, Md.: 105, Hypopygium, left lateral; 106, hypandrium, ventral; 107, aedeagus, ventral.





108

Figures 108-112.—*Medetera marylandica*, Bethesda, Md.: 108, Hypopygium, left lateral; 109, hypandrium, ventral; 110, aedeagus, ventral; 111, cerci, dorsal; 112, male wing, left dorsal.



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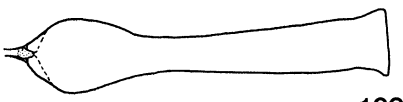

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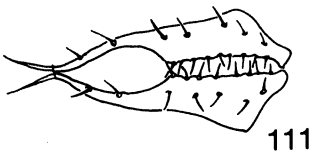

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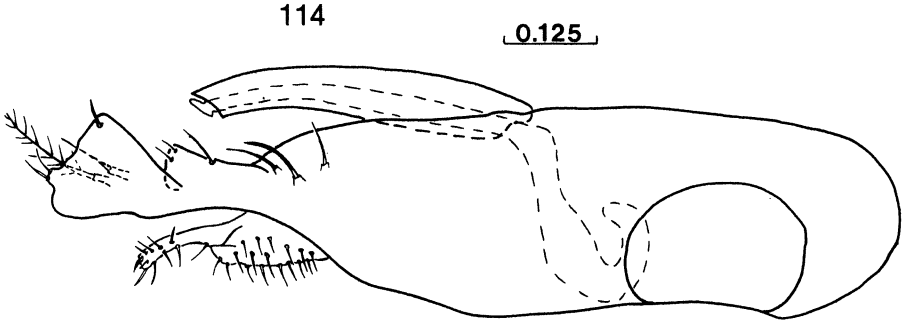
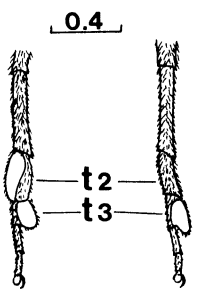


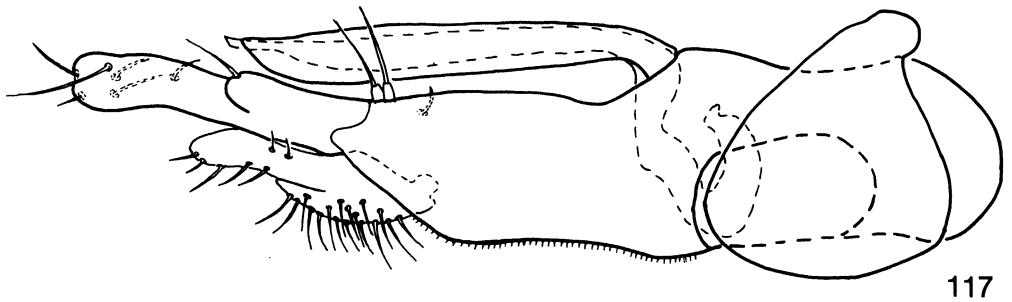
113

Figures 113-116.—*Medetera aberrans*, Orillia, Ontario: 113, Hypopygium, left lateral; 114, hypandrium, ventral; 115, male left foretarsus, anterior; 116, male left foretarsus, anterior, Carteret Co., N.C.



116 115

Figures 117-118.—*Medetera vockerothi,* Yellowknife, Northwest Territories: 117, Hypopygium, left lateral; 118, hypopygium, ventral.



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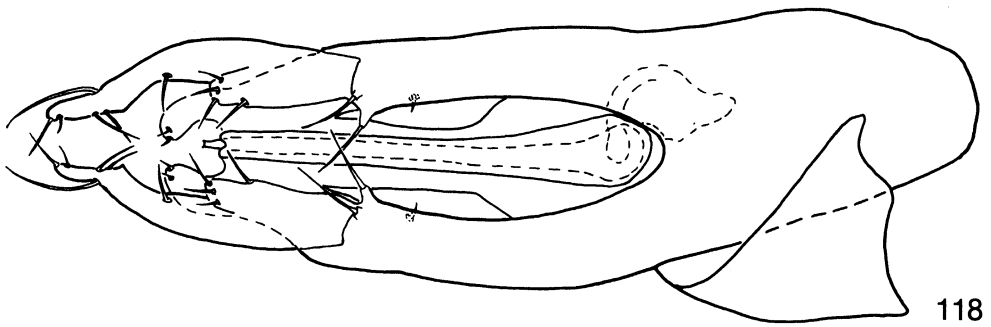

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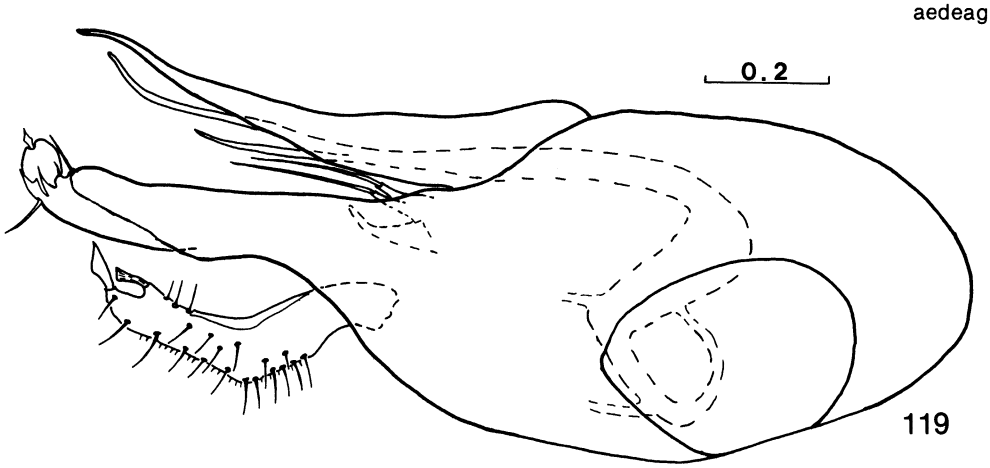
Figures 119-121.—*Medetera diadema,* Farmingdale, N.J.: 119, Hypopygium, left lateral; 120, hypandrium, ventral; 121, aedeagus, ventral.



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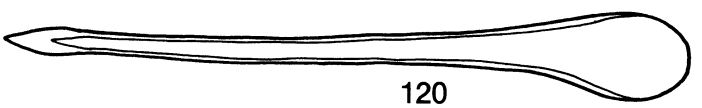

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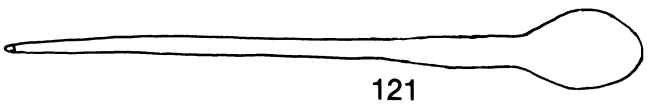

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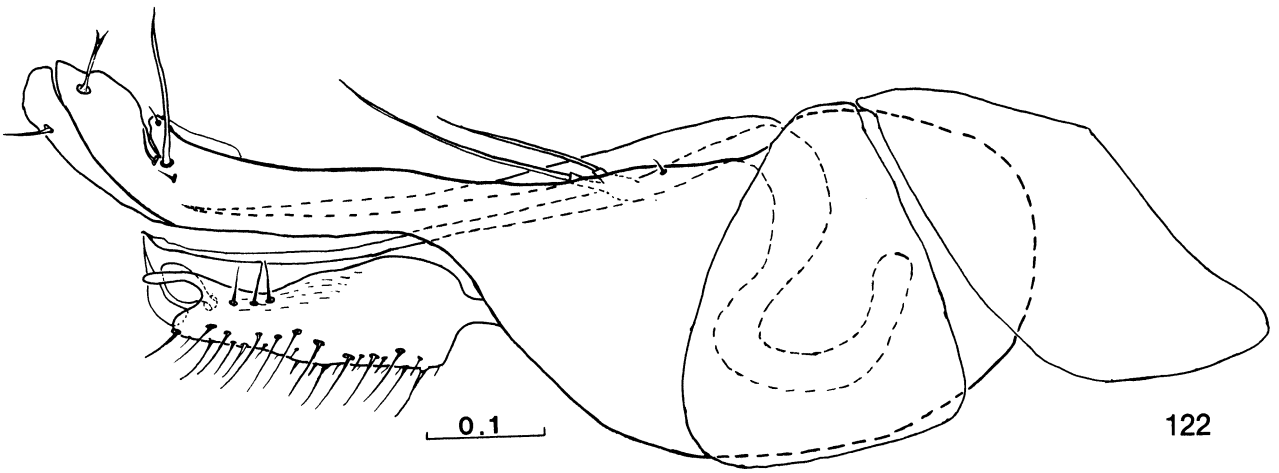
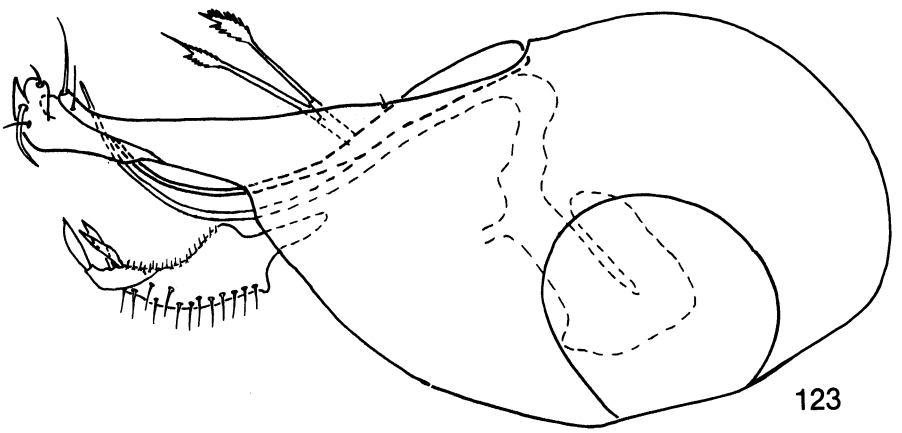
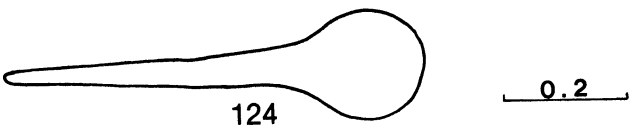
Figure 122.—*Medetera truncorum,* Ocean Park, Wash.: Hypopygium, left lateral.



Figures 123-125.—*Medetera arnaudi,* Redwood City, Calif.: 123, Hypopygium, left lateral; 124, hypandrium, ventral; 125, aedeagus, ventral.





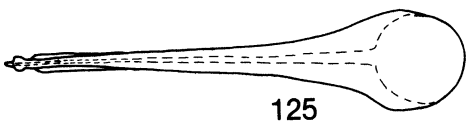


Figure 126.—*Medetera halteralis,* Laprairie, Quebec: Hypopygium, left lateral.

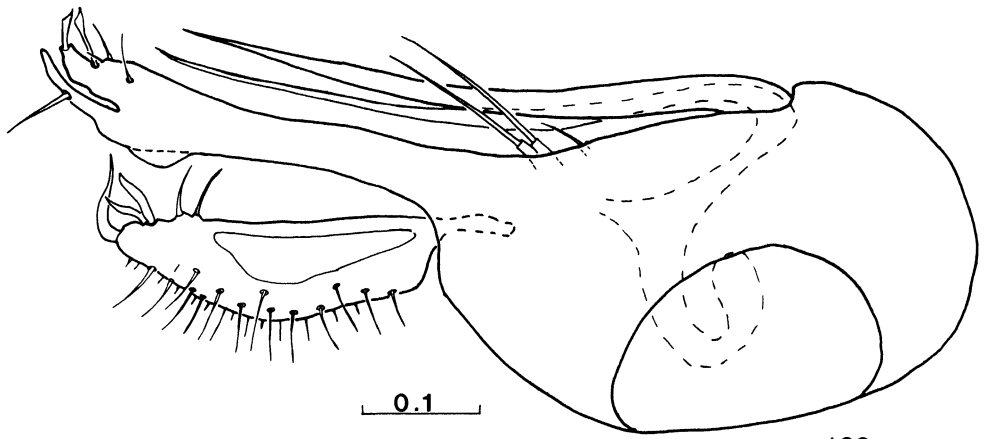


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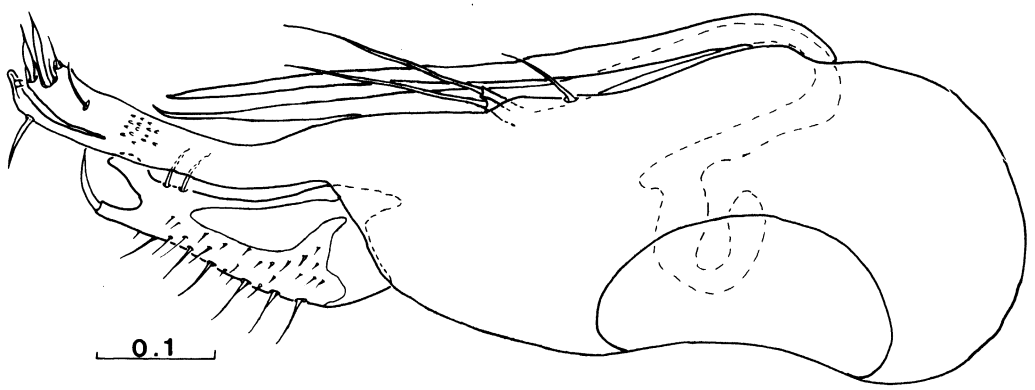
Figure 127.—*Medetera modesta,* Mt. Enotah, Ga.: Hypopygium, left lateral.



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Figures 128-130.—*Medetera californiensis,* Palo Alto, Calif.: 128, Hypopygium, left lateral; 129, hypandrium, ventral; 130, aedeagus, ventral.

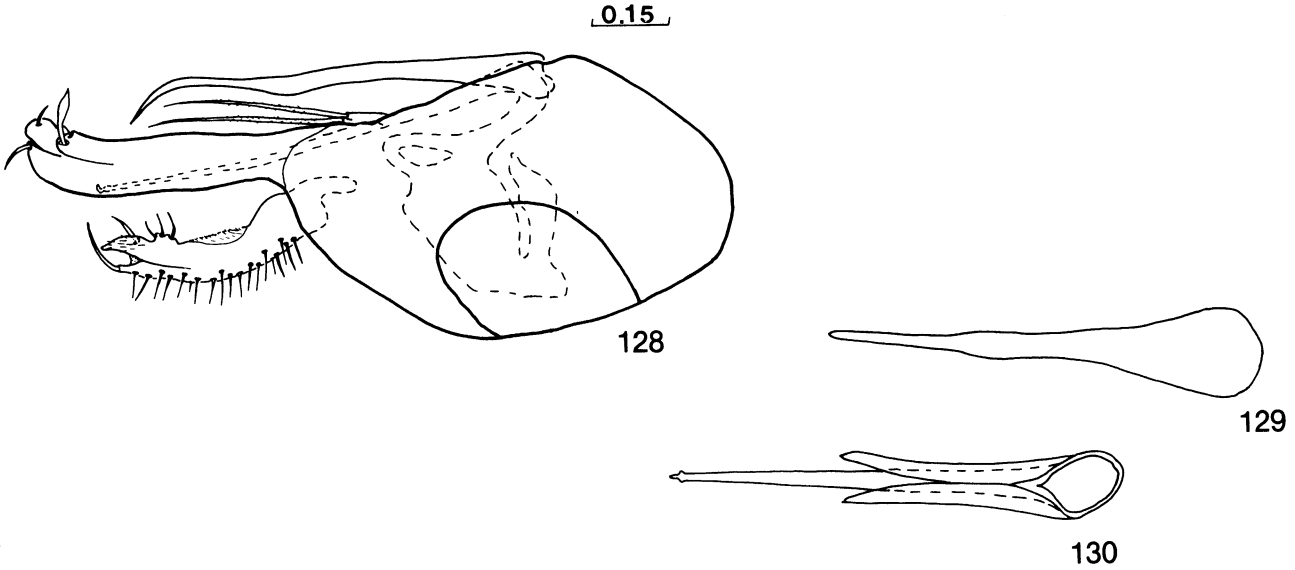
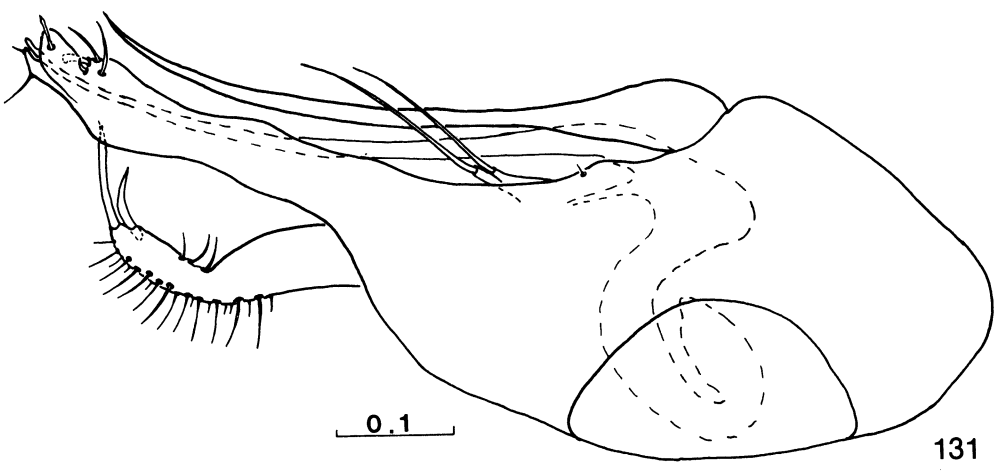
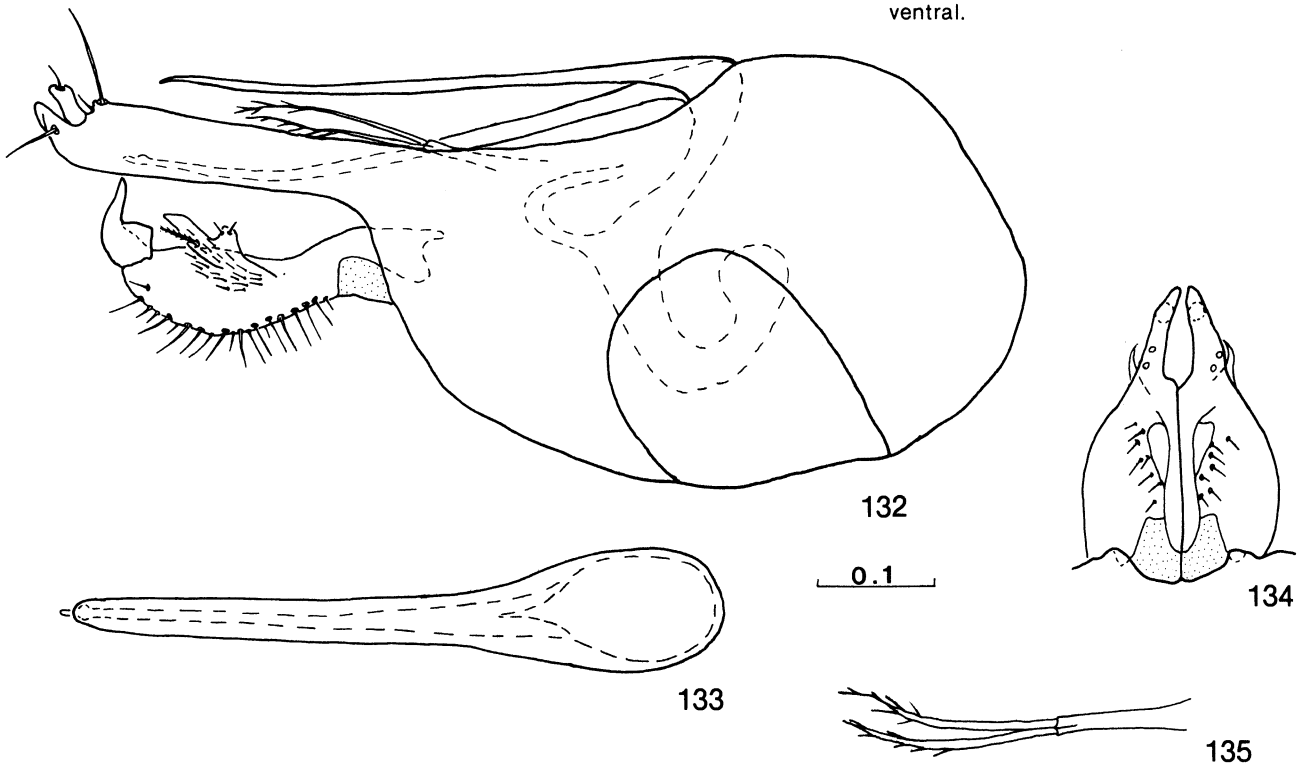


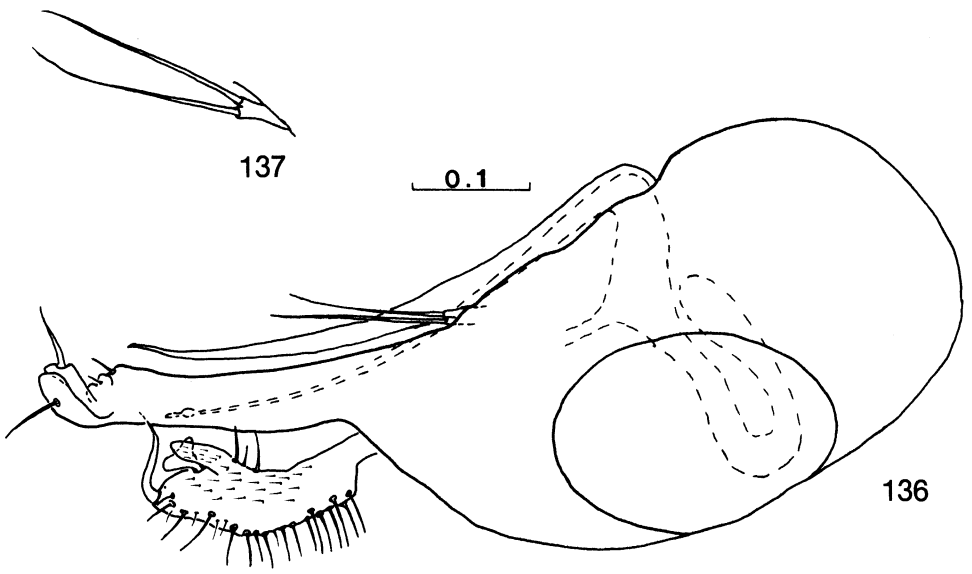
Figure 131.—*Medetera tuktoyaktuk,* Tuktoyaktuk, Northwest Territories: Hypopygium, left lateral.



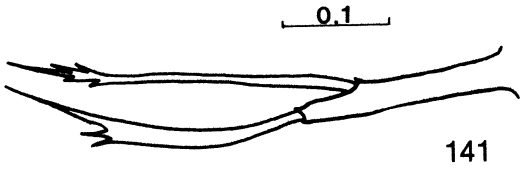
Figures 132-135.—*Medetera nigripes,* Randolf, N.H.: 132, Hypopygium, left lateral; 133, hypandrium and aedeagus, ventral; 134, cerci, dorsal; 135, left epandrial lobe, ventral.



Figures 136-137.—*Medetera canadensis,* Itasca State Park, Minn.: 136, Hypopygium, left lateral; 137, right epandrial lobe, ventral.



Figures 138-142.—*Medetera vittata,* Kearney, Ontario: 138, Hypopygium, left lateral; 139, hypopygium, dorsal; 140, aedeagus, ventral; 141, left epandrial lobe, ventral; 142, left leg I, posterior view.



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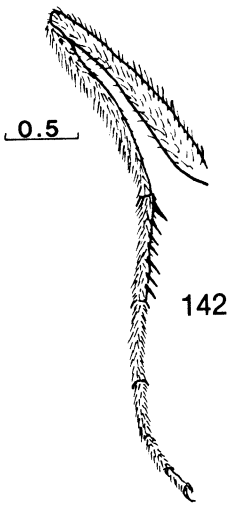

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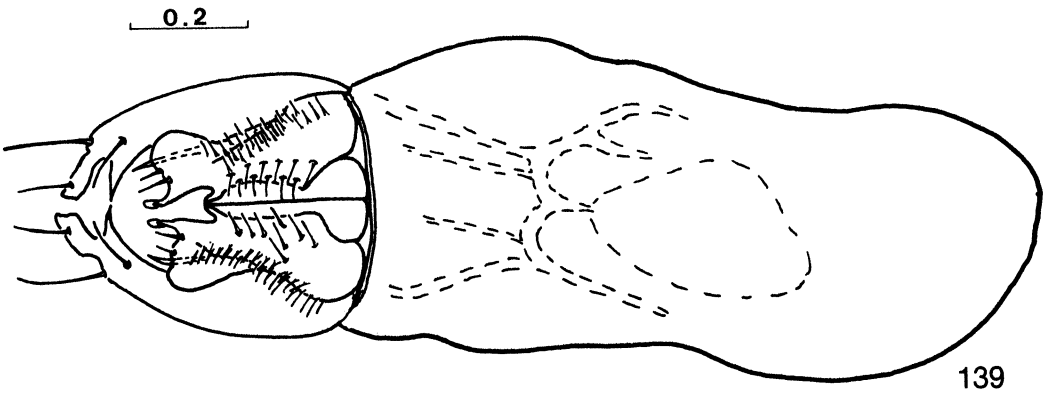

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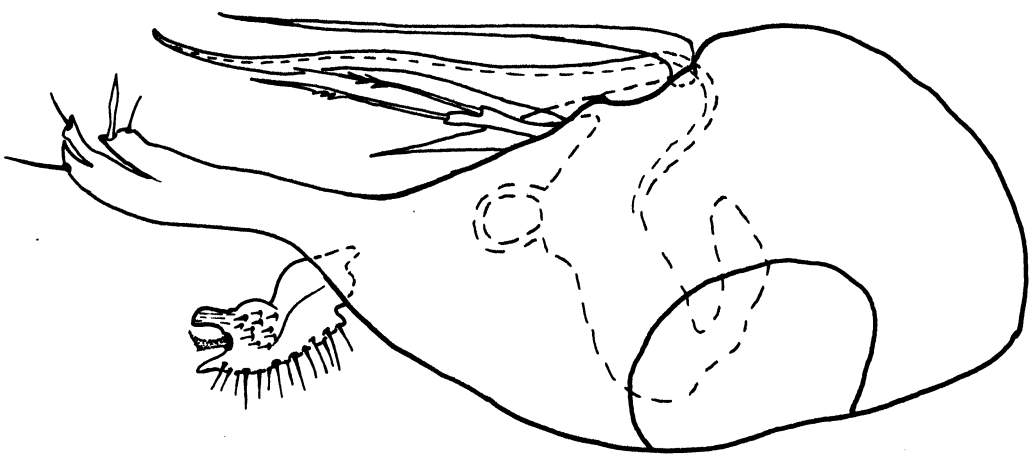

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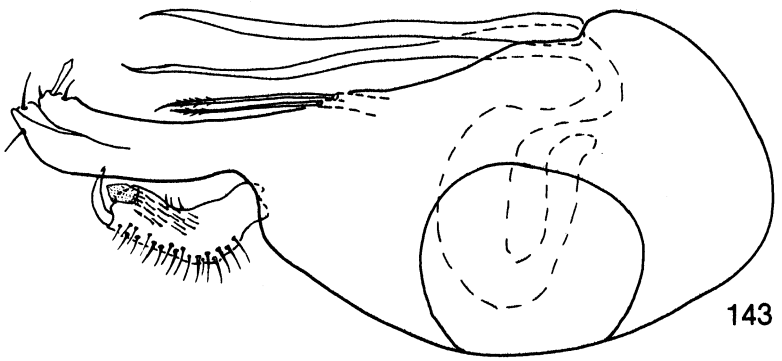
Figures 143-149.—*Medetera veles,* Washington, D.C.: 143, Hypopygium, left lateral; 144, hypopygium, dorsal; 145, cerci, left lateral, Jefferson Co., Tenn.; 146, cerci, left lateral, Speculator, N.Y.; 147, cerci, left lateral, Galveston, Tex.; 148, cerci, left lateral, Rocky Ford, Colo.; 149, cerci, left lateral, Bon Echo, Ontario.



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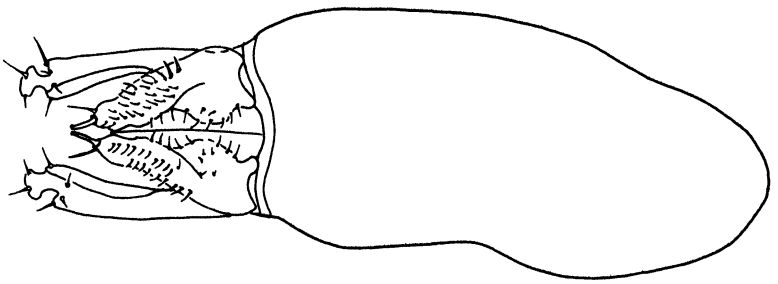

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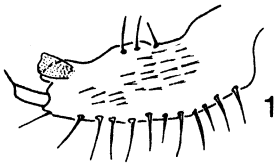

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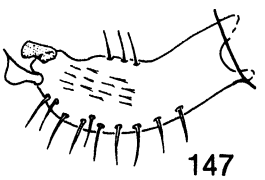

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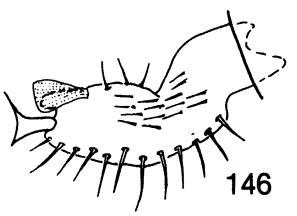

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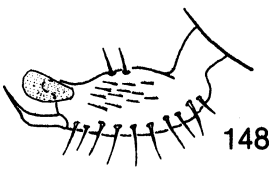

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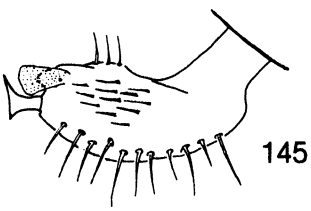

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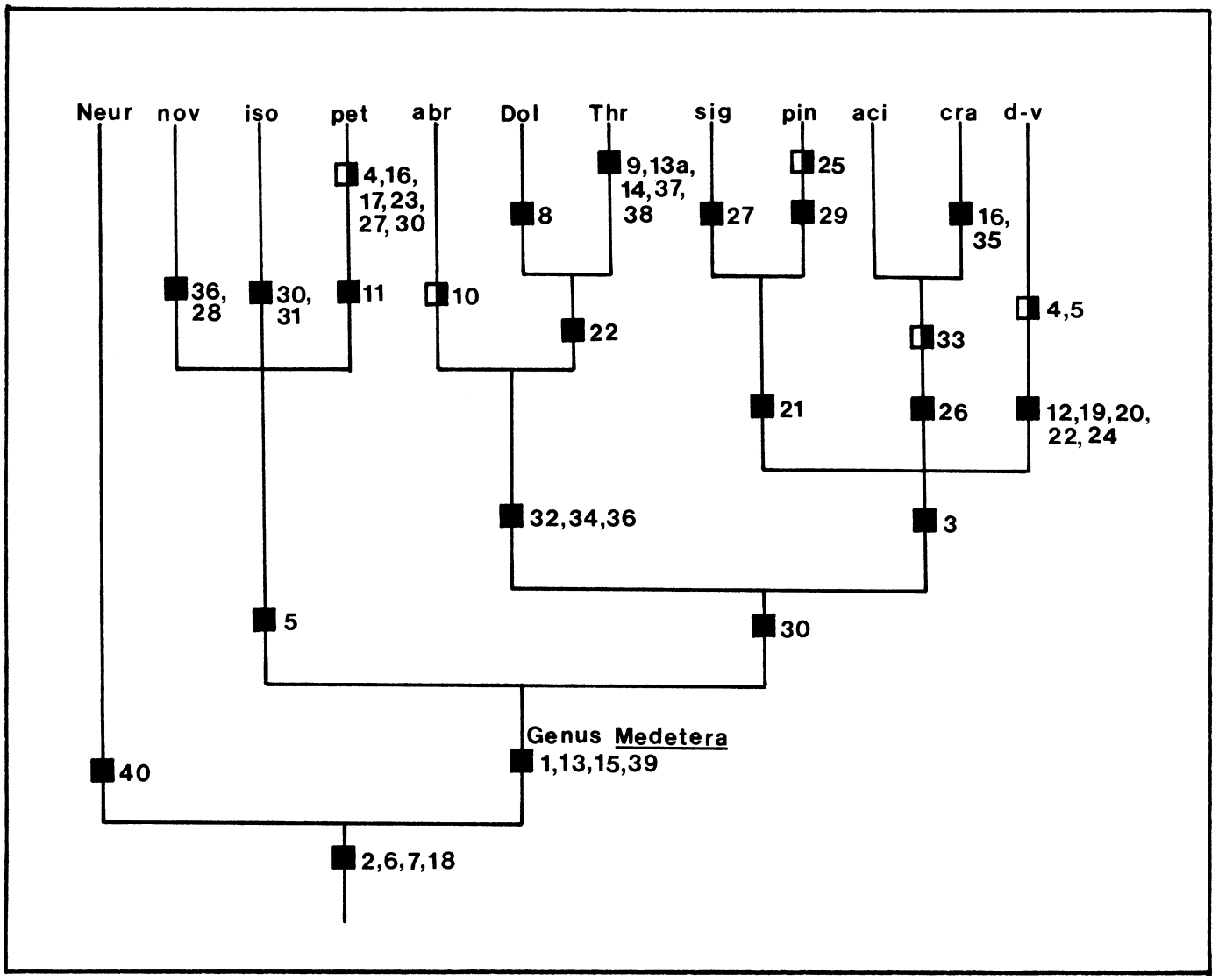


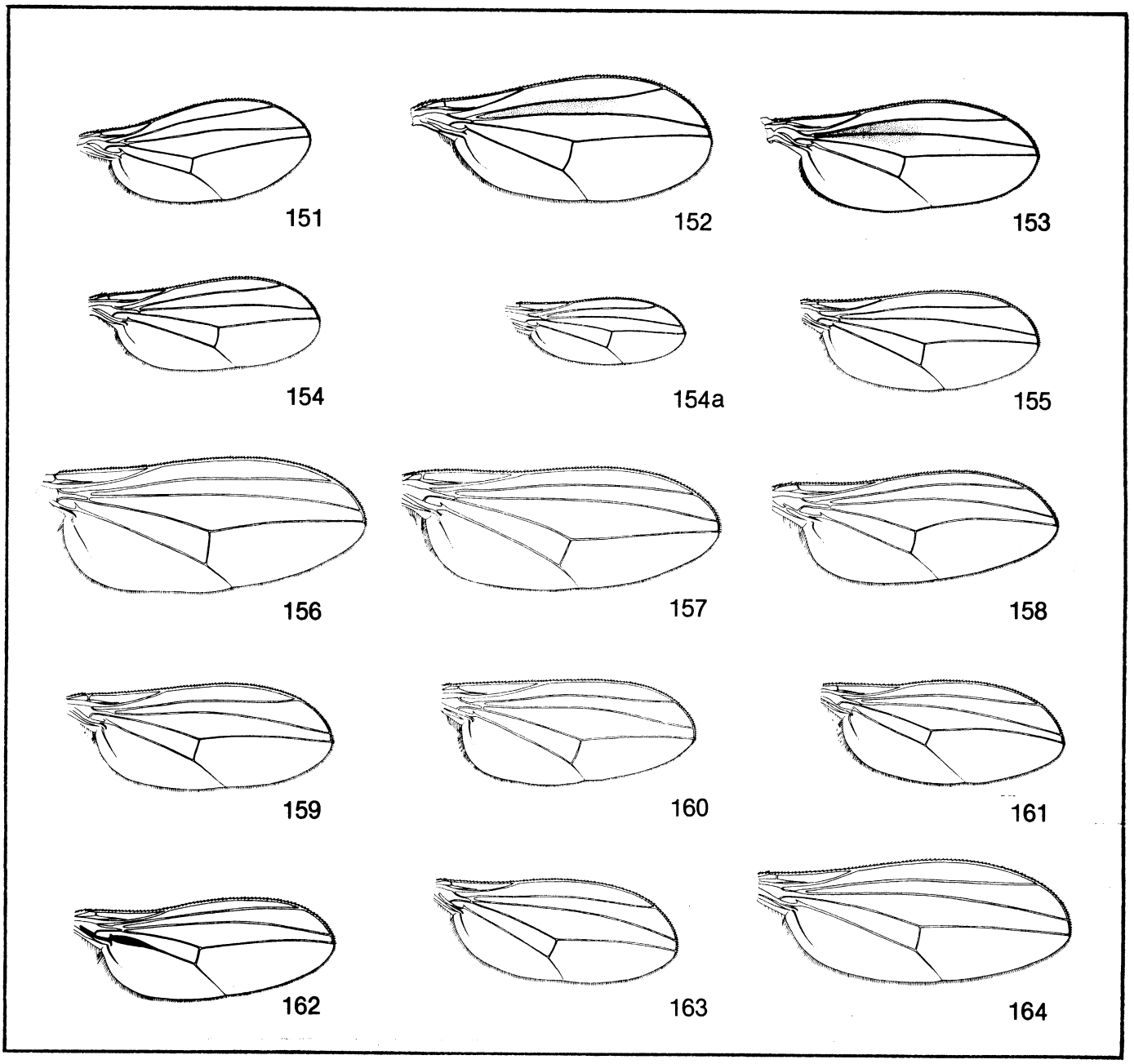
Figure 150.—Cladogram of Holarctic *Medetera*.

■ Apomorphy

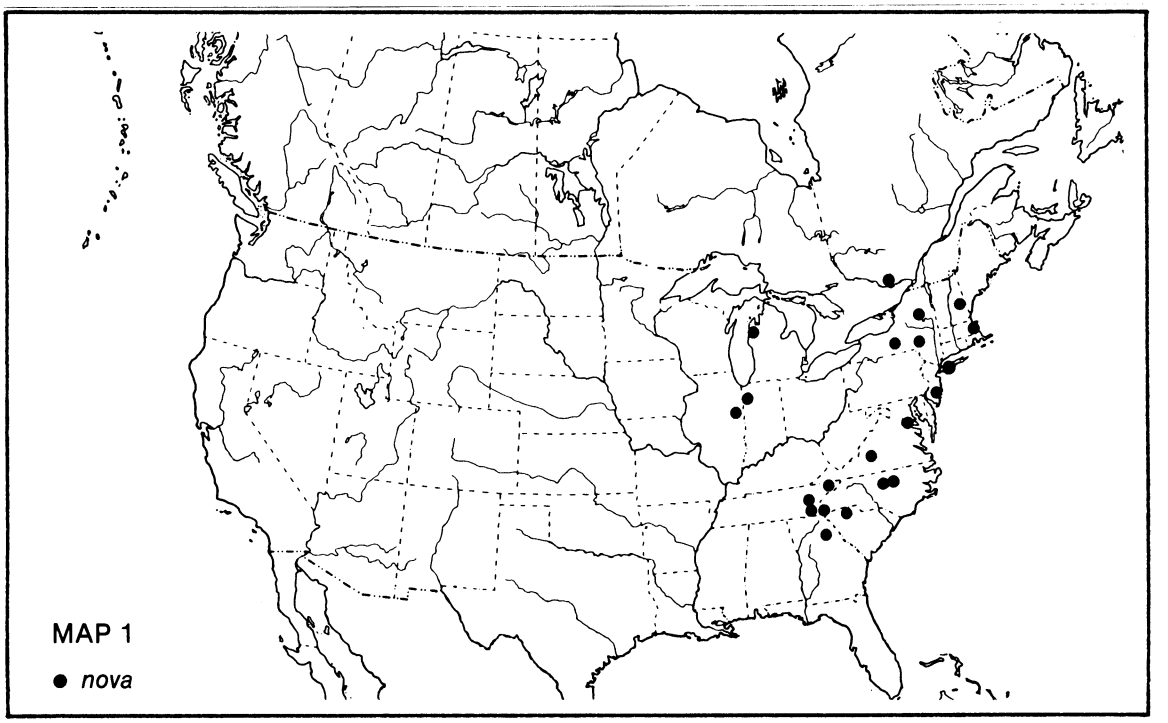
◨ Apomorphy shared by only some members of group

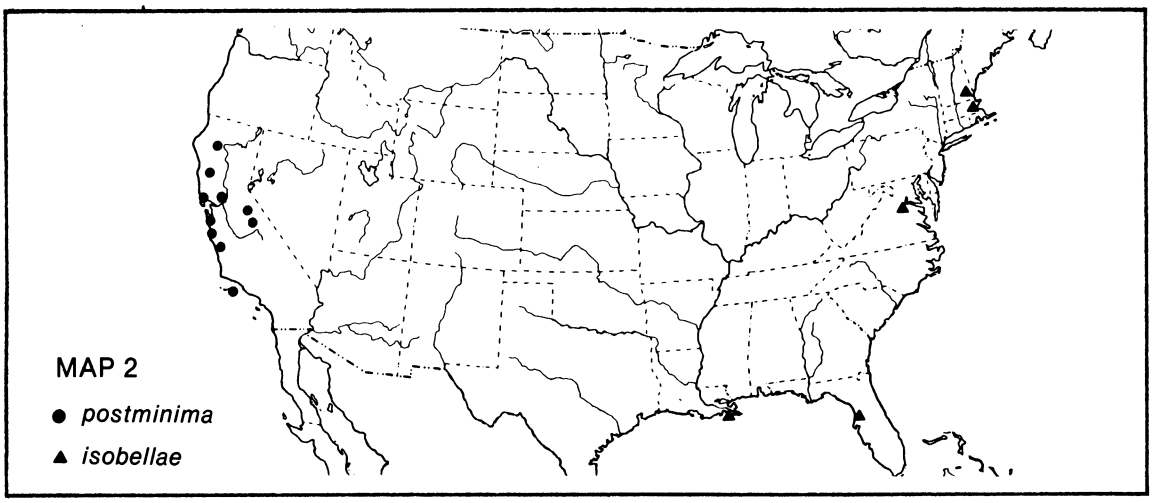
abr, *aberrans* group; aci, *apicalis* group; cra, *crassivenis* group; d-v, *diadema-veles* group; iso, *isobellae* group; nov, *nova* group; pet, *petulca* group; pin, *pinicola* subgroup; sig, *signaticornis* subgroup. Dol, *Dolichophorus;* Neur, Neurigoninae; Thr, *Thrypticus.*

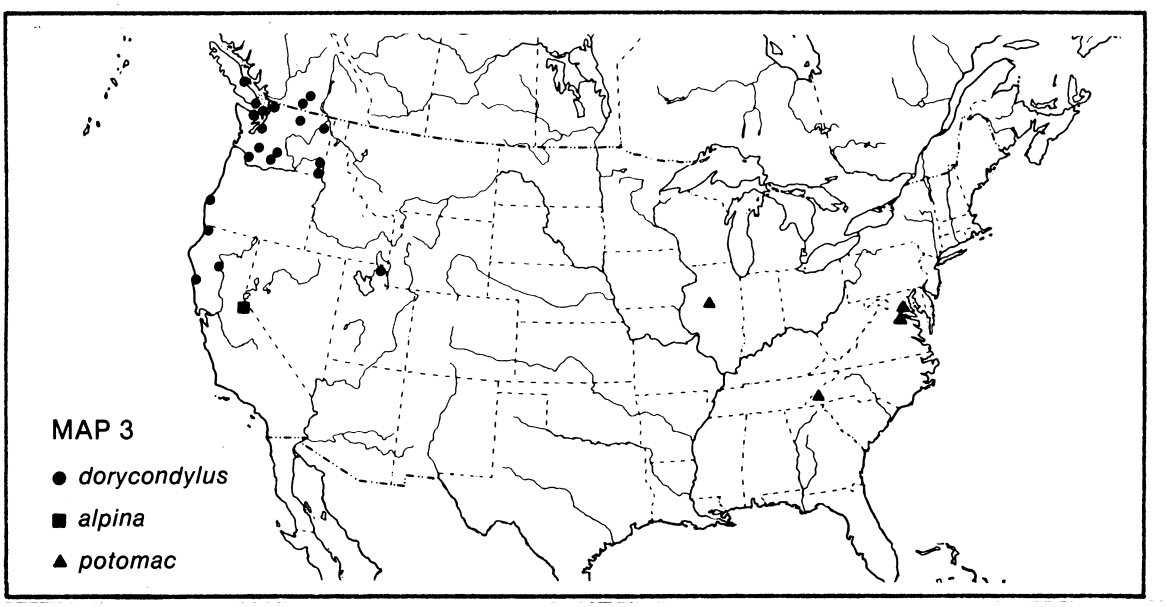
Note: The numbers on the cladogram refer to characters described in the text under Phylogenetic Analysis.

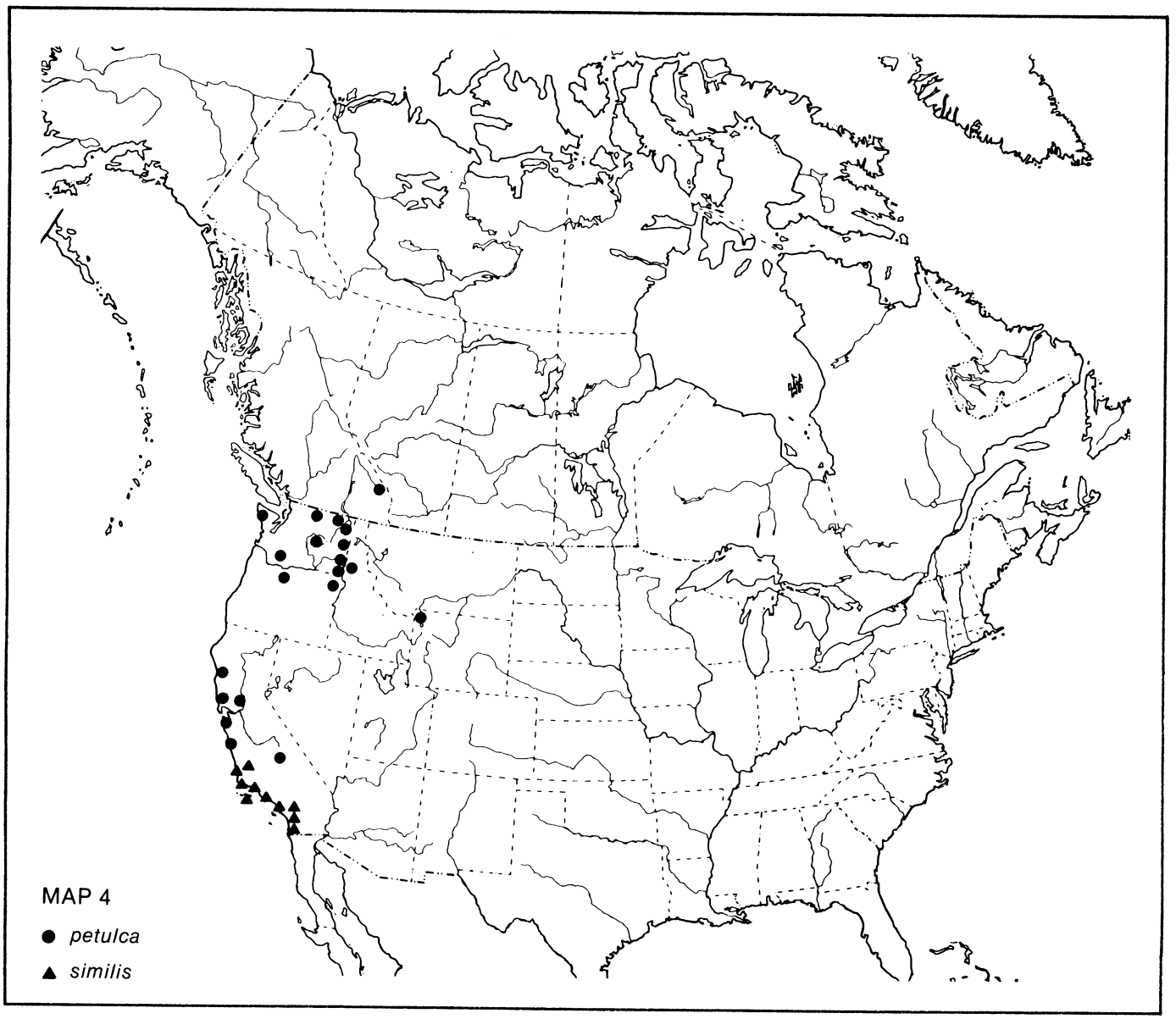


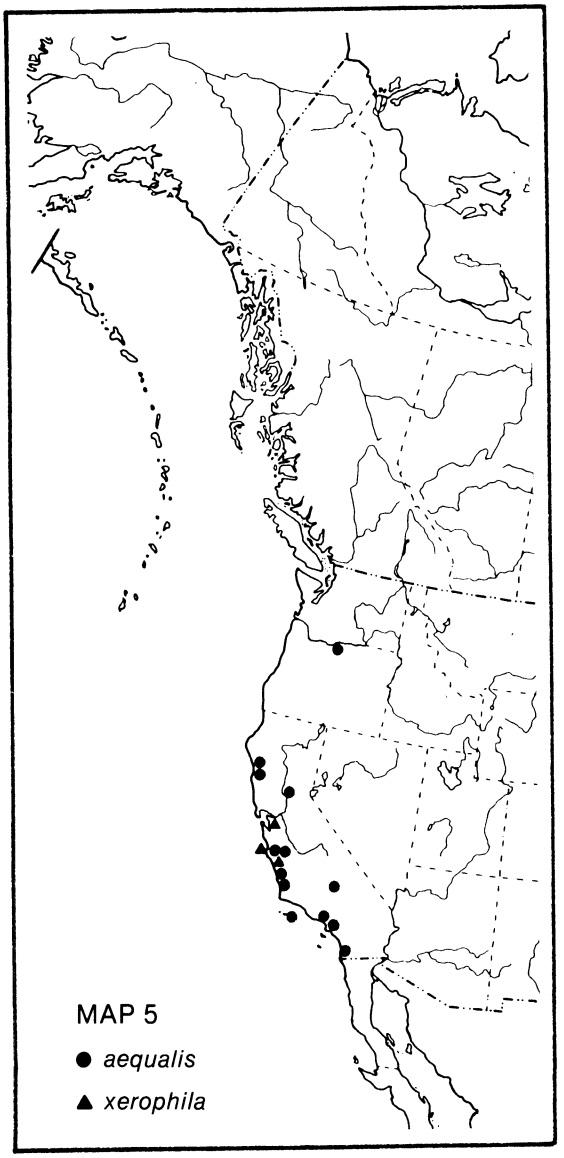
Figures 151-164.—Right wing of *Medetera* species: 151, *nova,* male; 152, *postminima,* female; 153, *petulca,* female; 154, *aequalis,* female, Dune Lakes, Calif.; 154a, *aequalis,* female, Pismo Beach, Calif.; 155, *vockerothi,* male; 156, *signaticornis,* male; 157, *bistriata,* male; 158, *pinicola,* male; 159, *apicalis,* male; 160, *saguaroicola,* female; 161, *longinervis,* female; 162, *crassivenis,* male; 163, *canadensis,* male; 164, *vittata,* male.

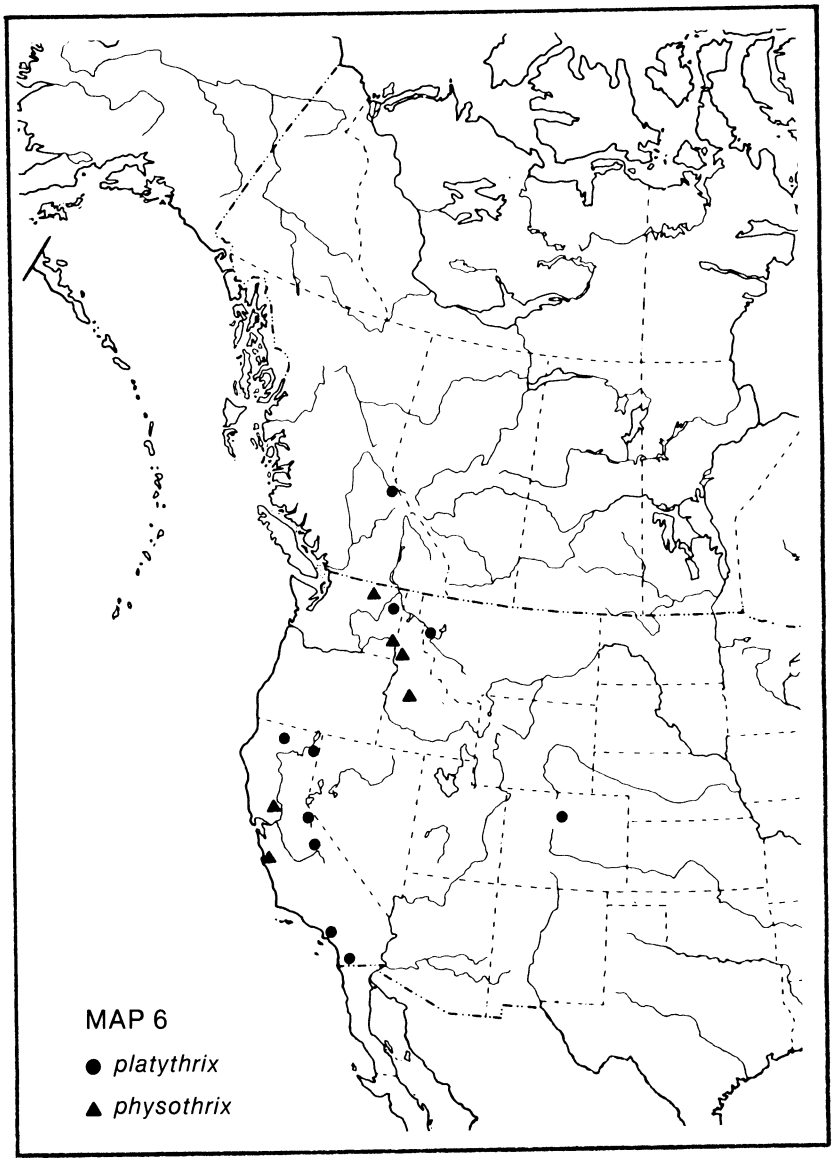

MAP 1
● nova

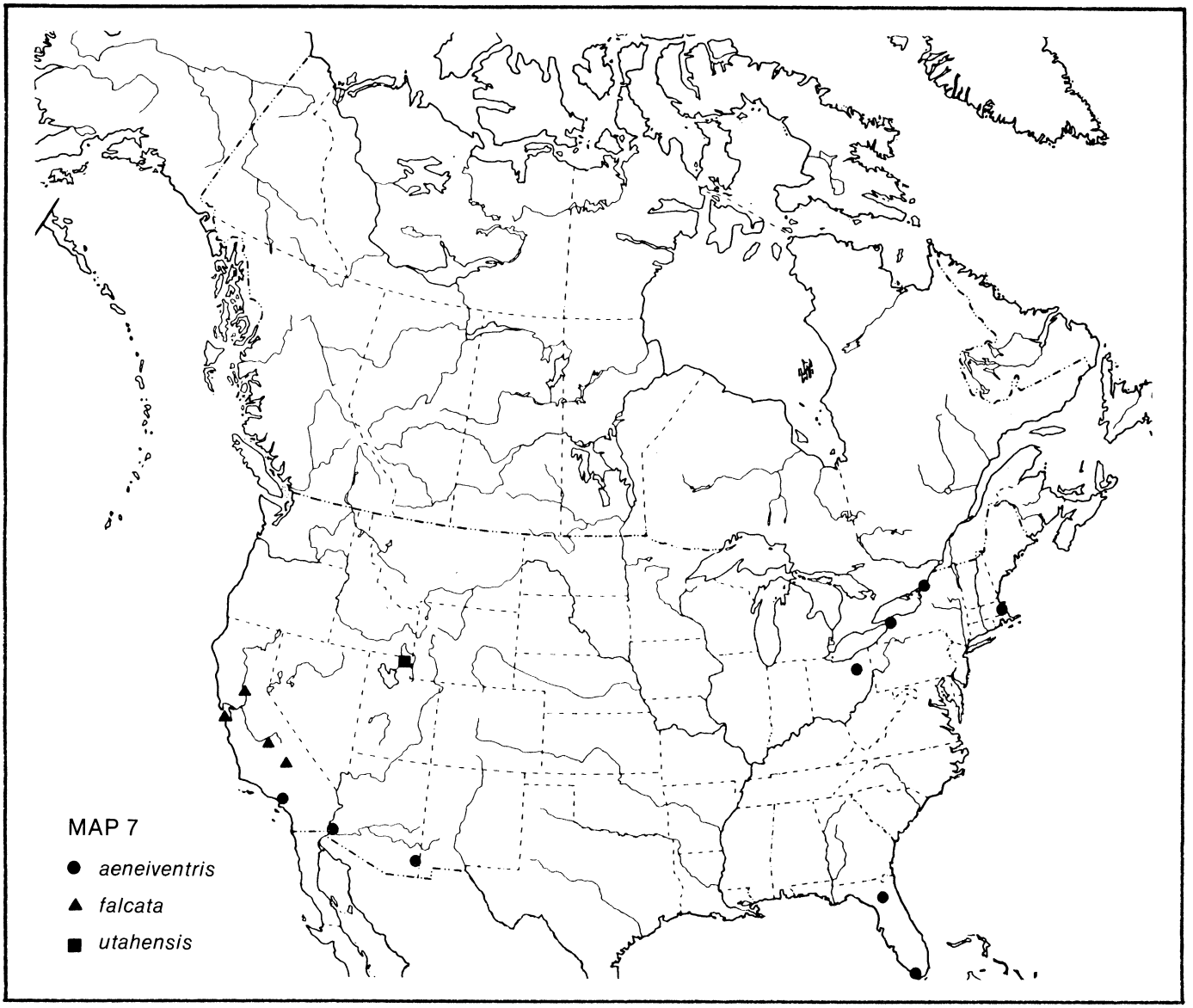

MAP 2
● postminima
▲ isobellae

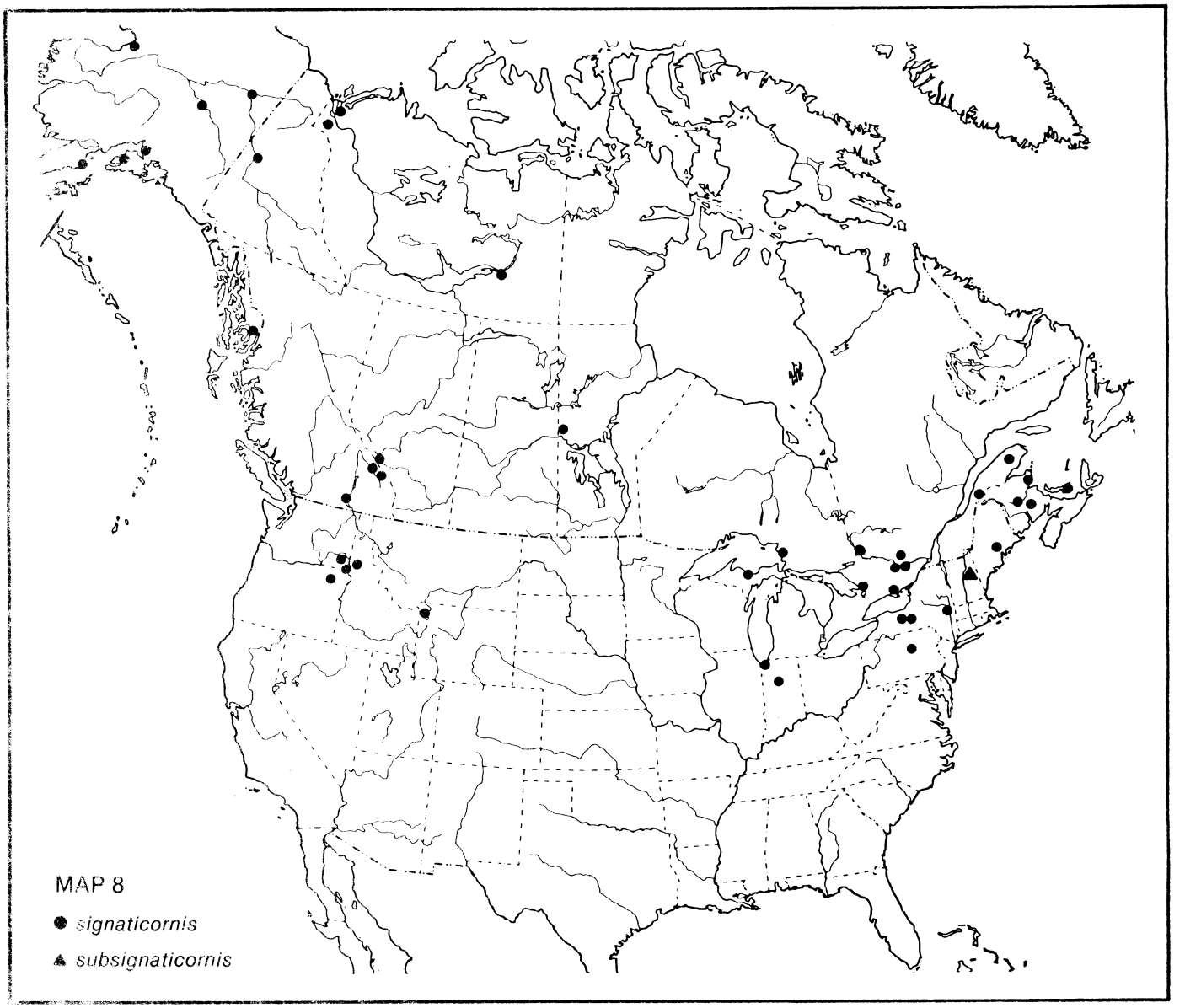

MAP 3
● dorycondylus
■ alpina
▲ potomac

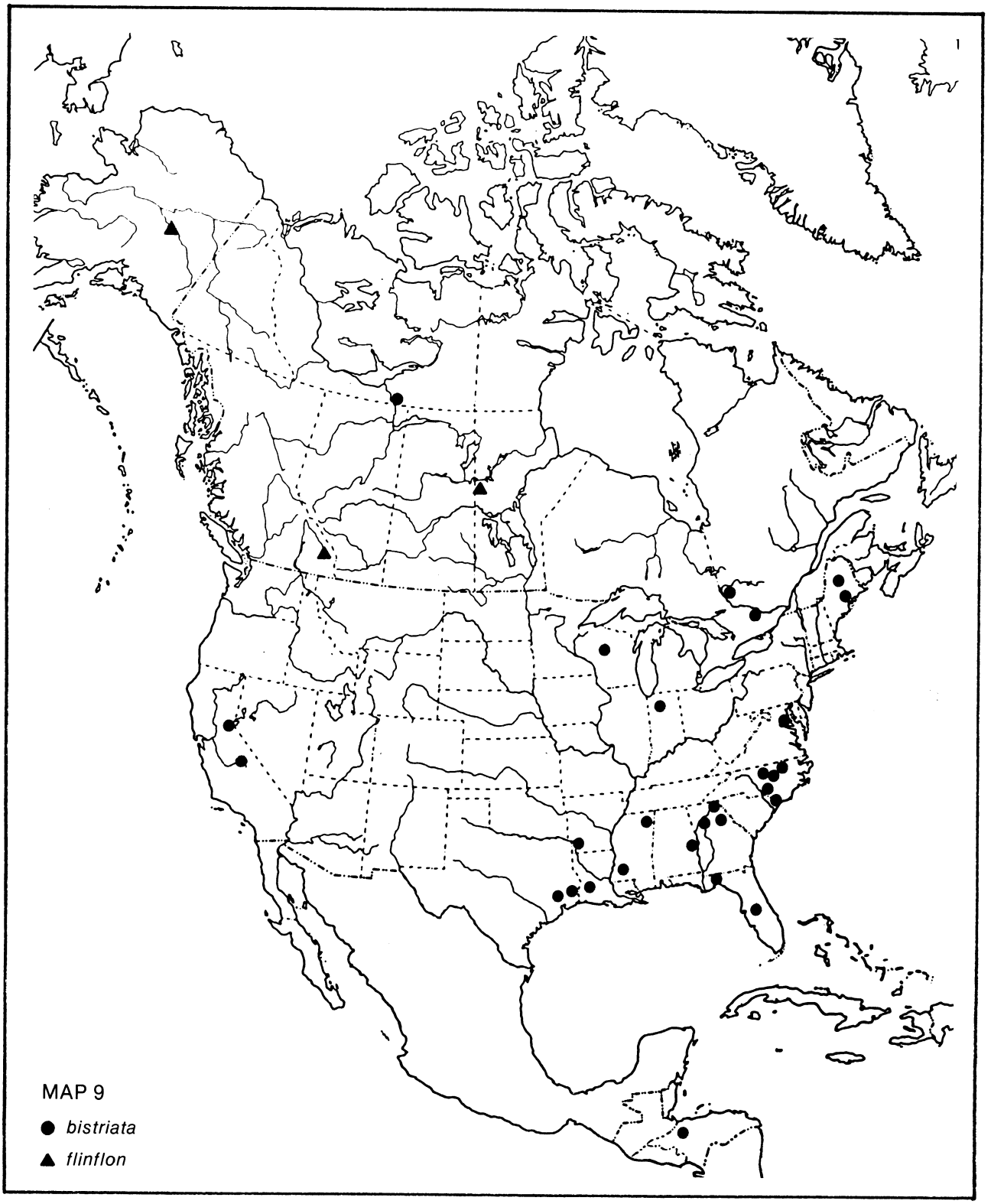

MAP 4
● petulca
▲ similis

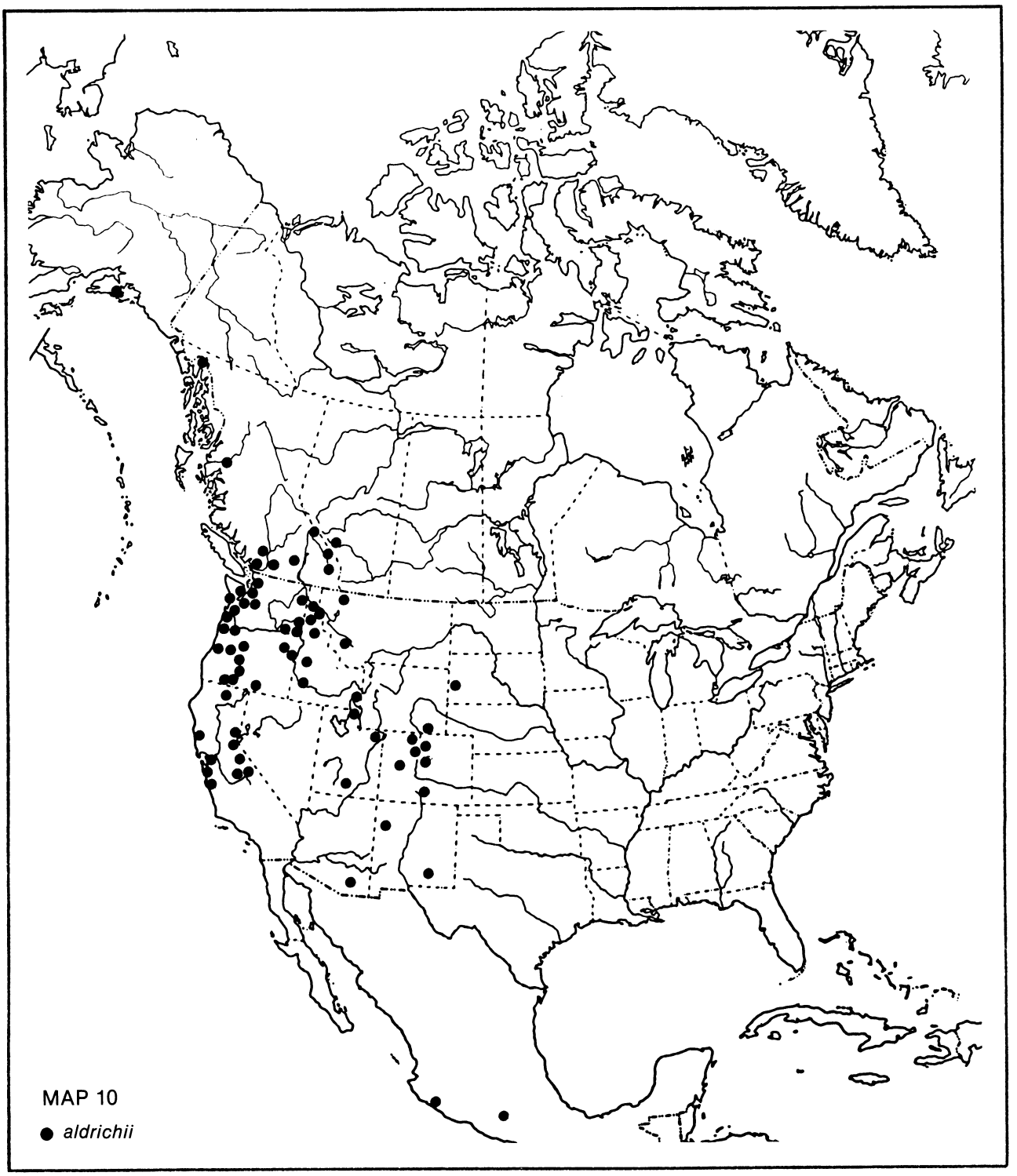

MAP 5
● aequalis
▲ xerophila

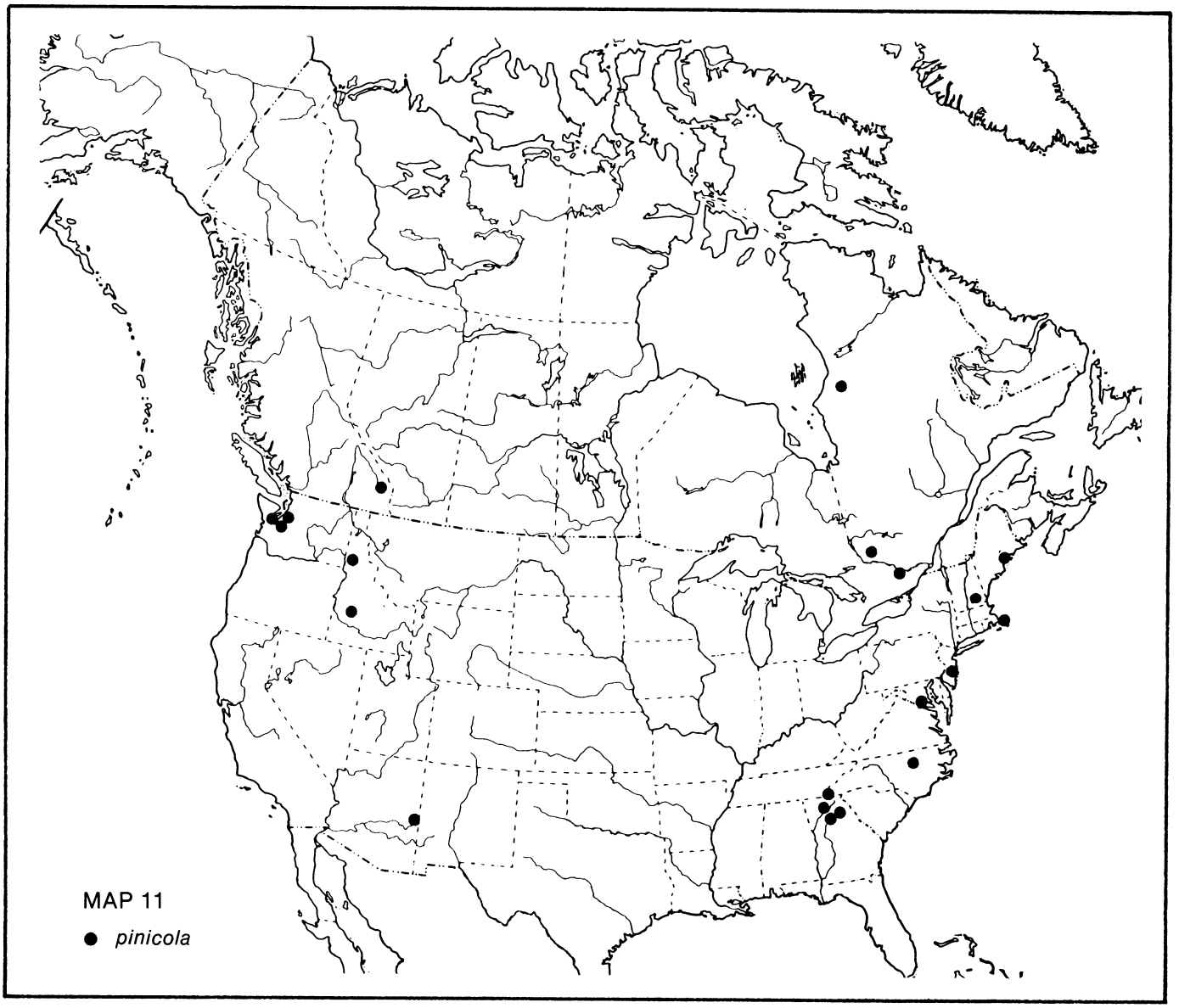

MAP 6
● platythrix
▲ physothrix

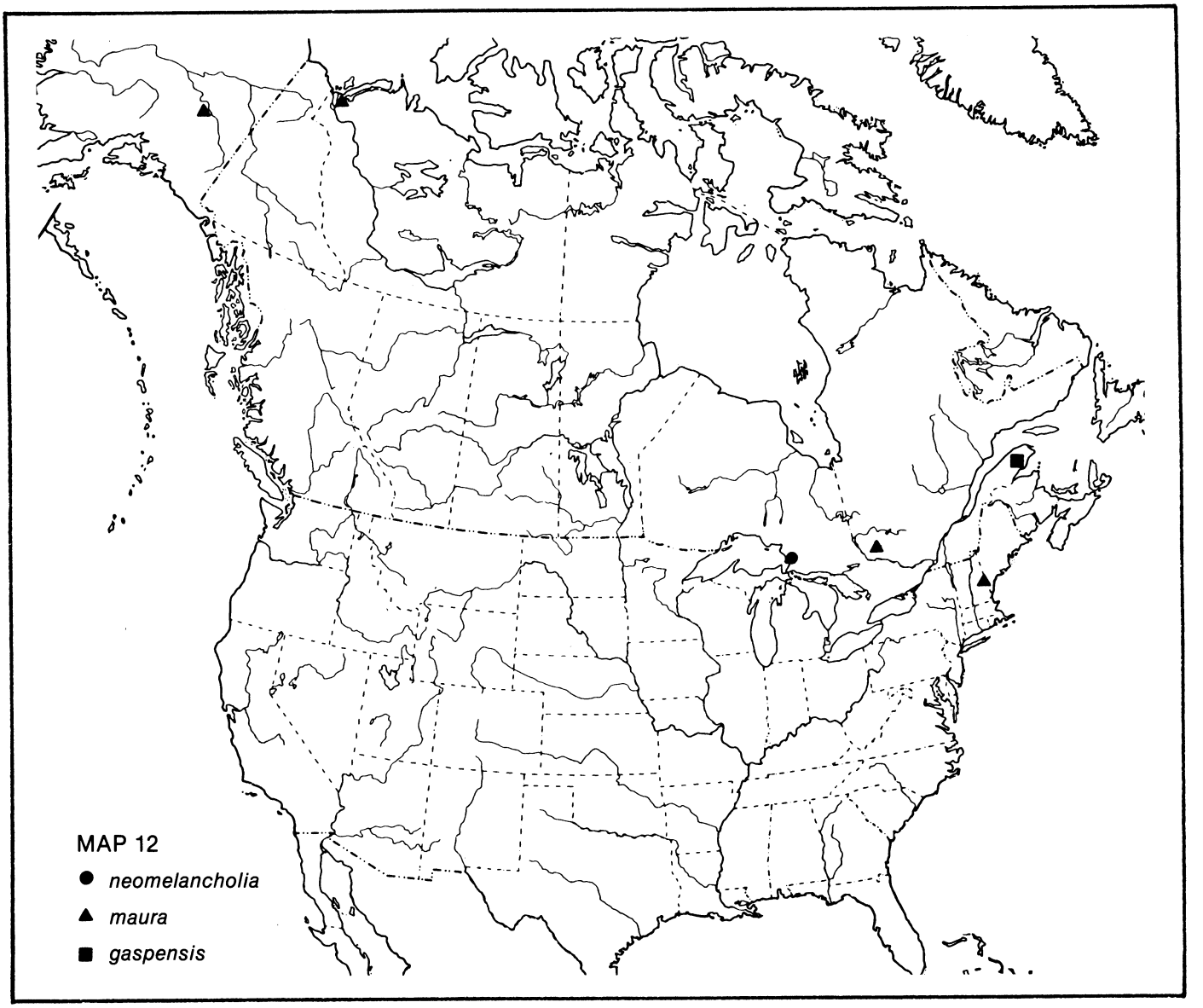

MAP 7
aeneiventris
falcata
utahensis

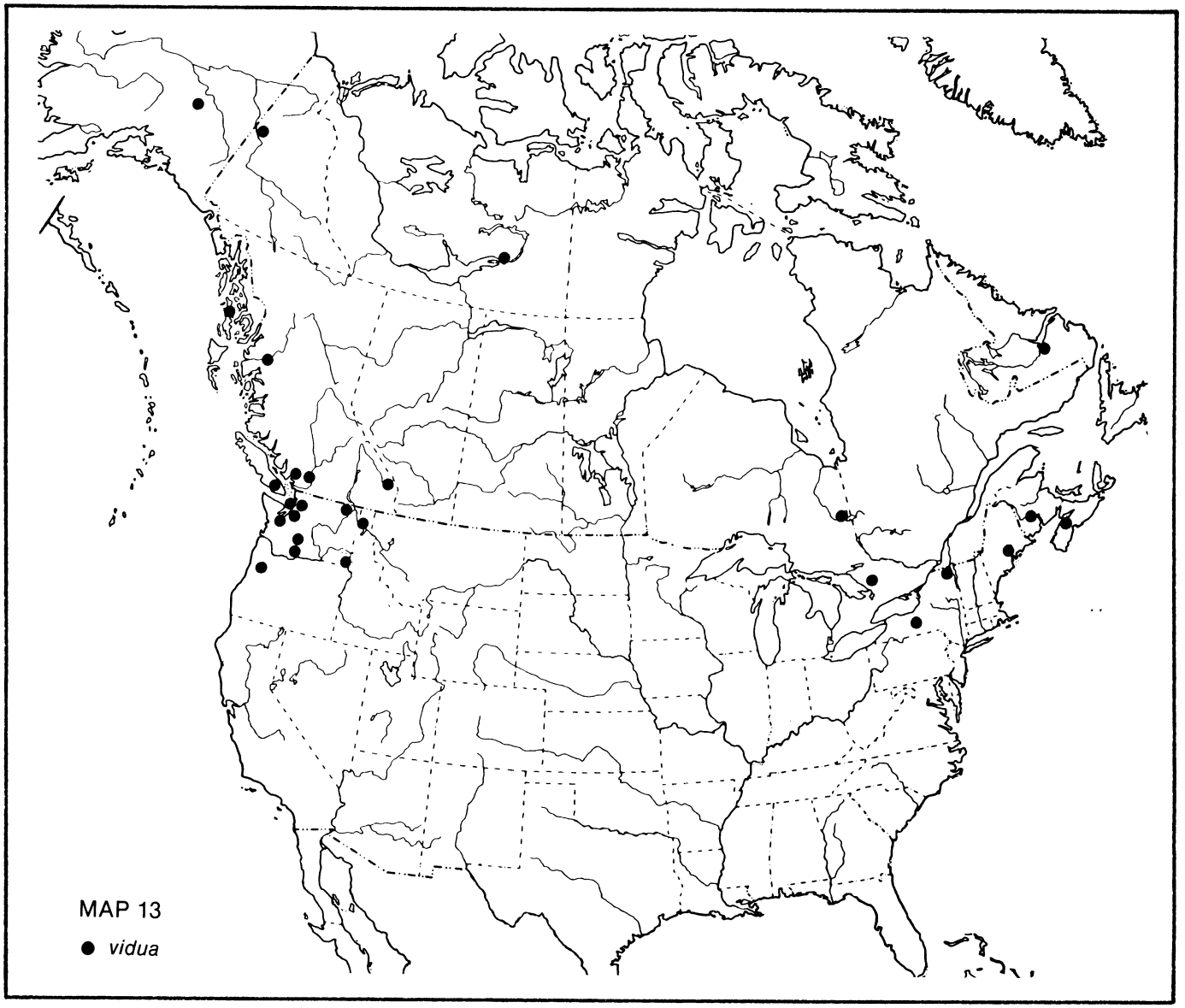

MAP 8
signaticornis
subsignaticornis

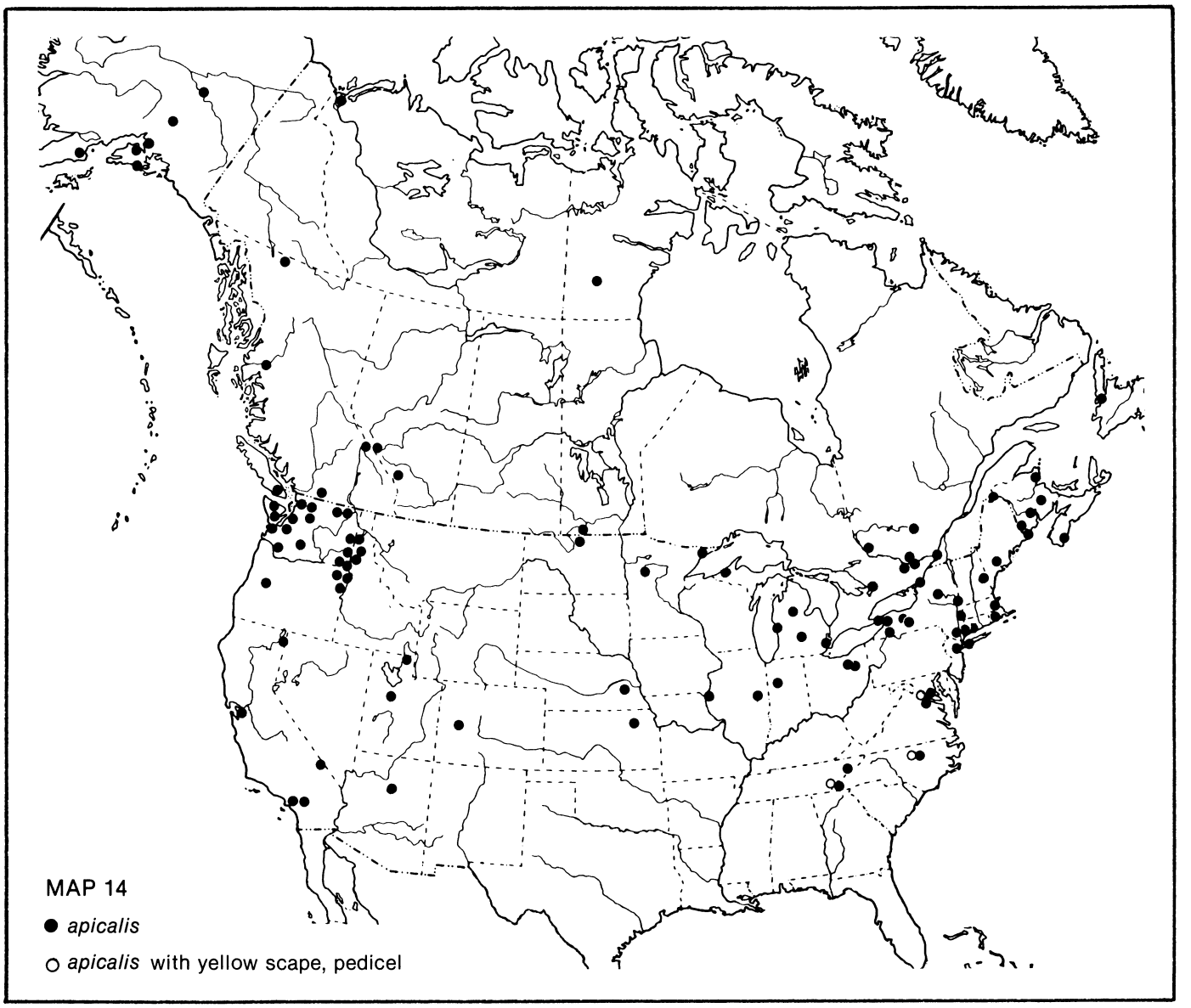

MAP 9
bistriata
flinflon

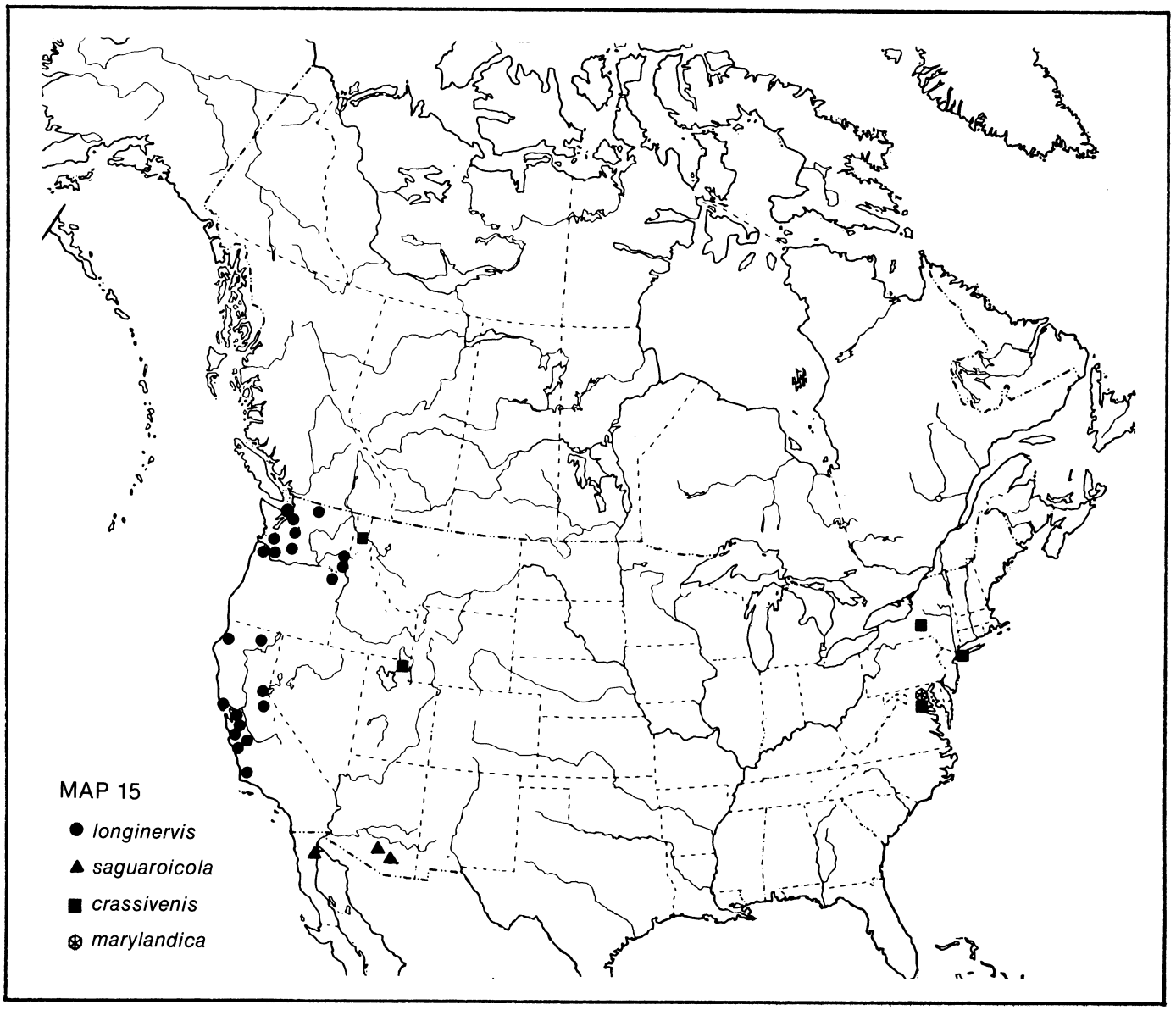

MAP 10
● *aldrichii*

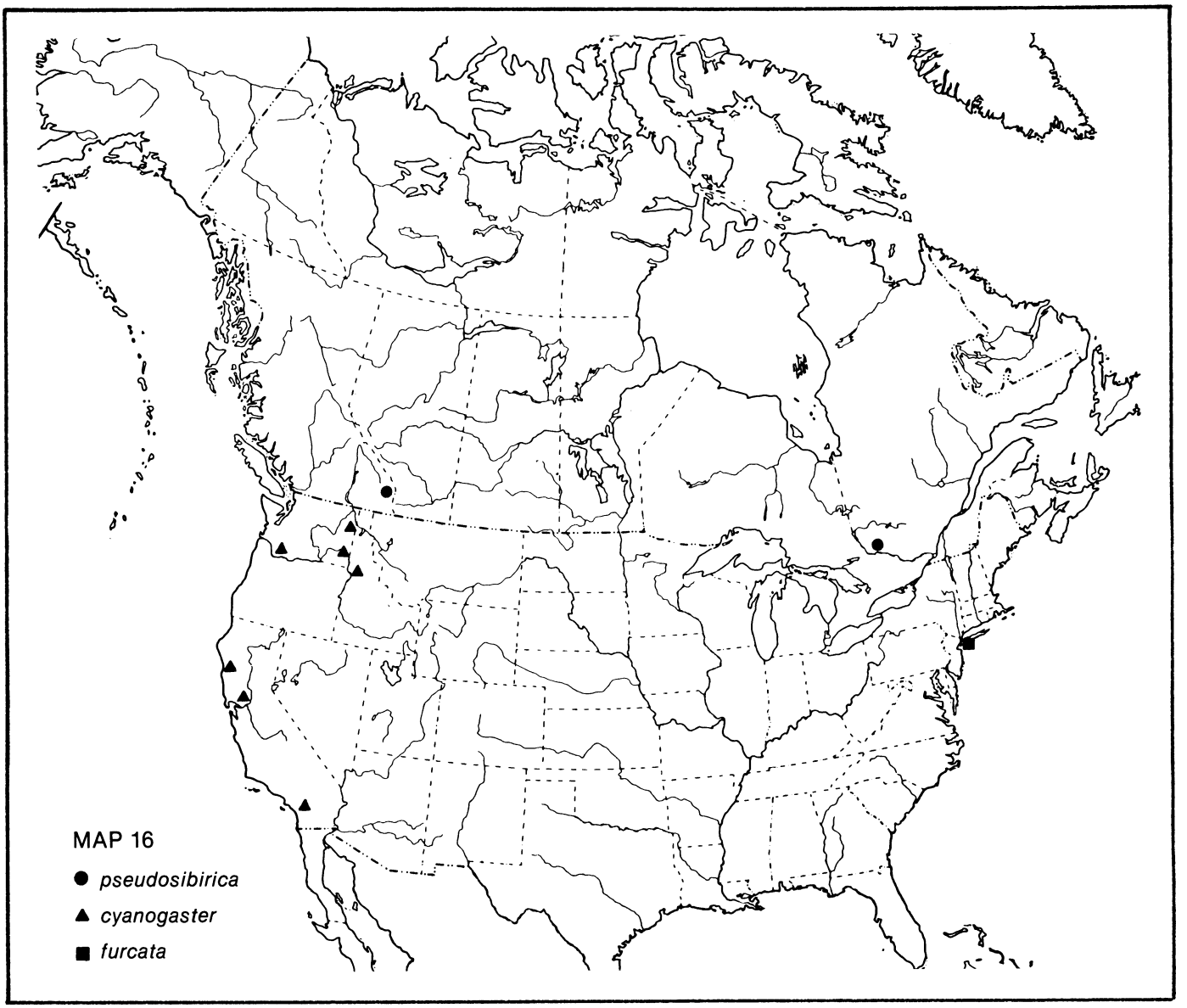

MAP 11
● *pinicola*

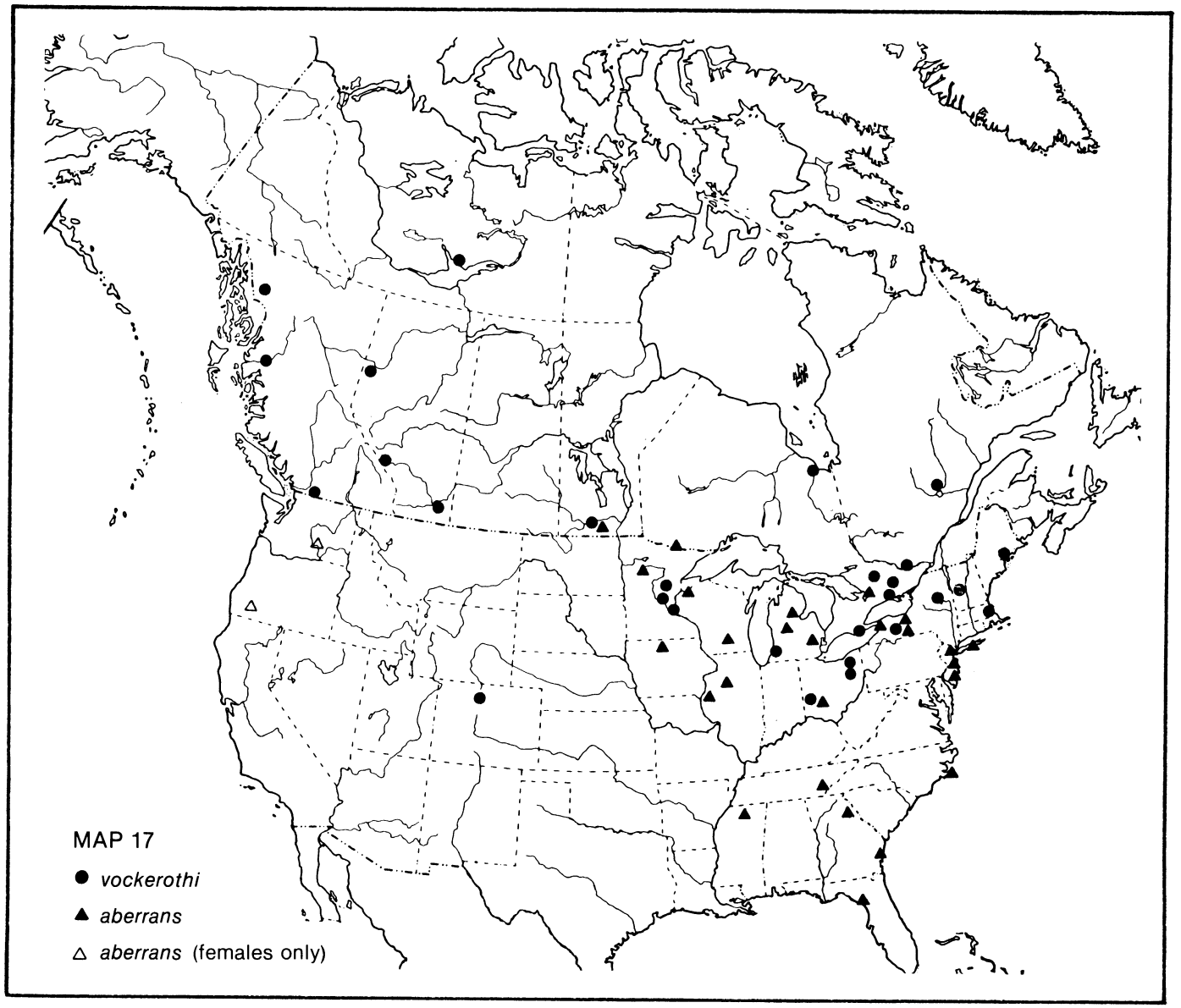

MAP 12
● neomelancholia
▲ maura
■ gaspensis

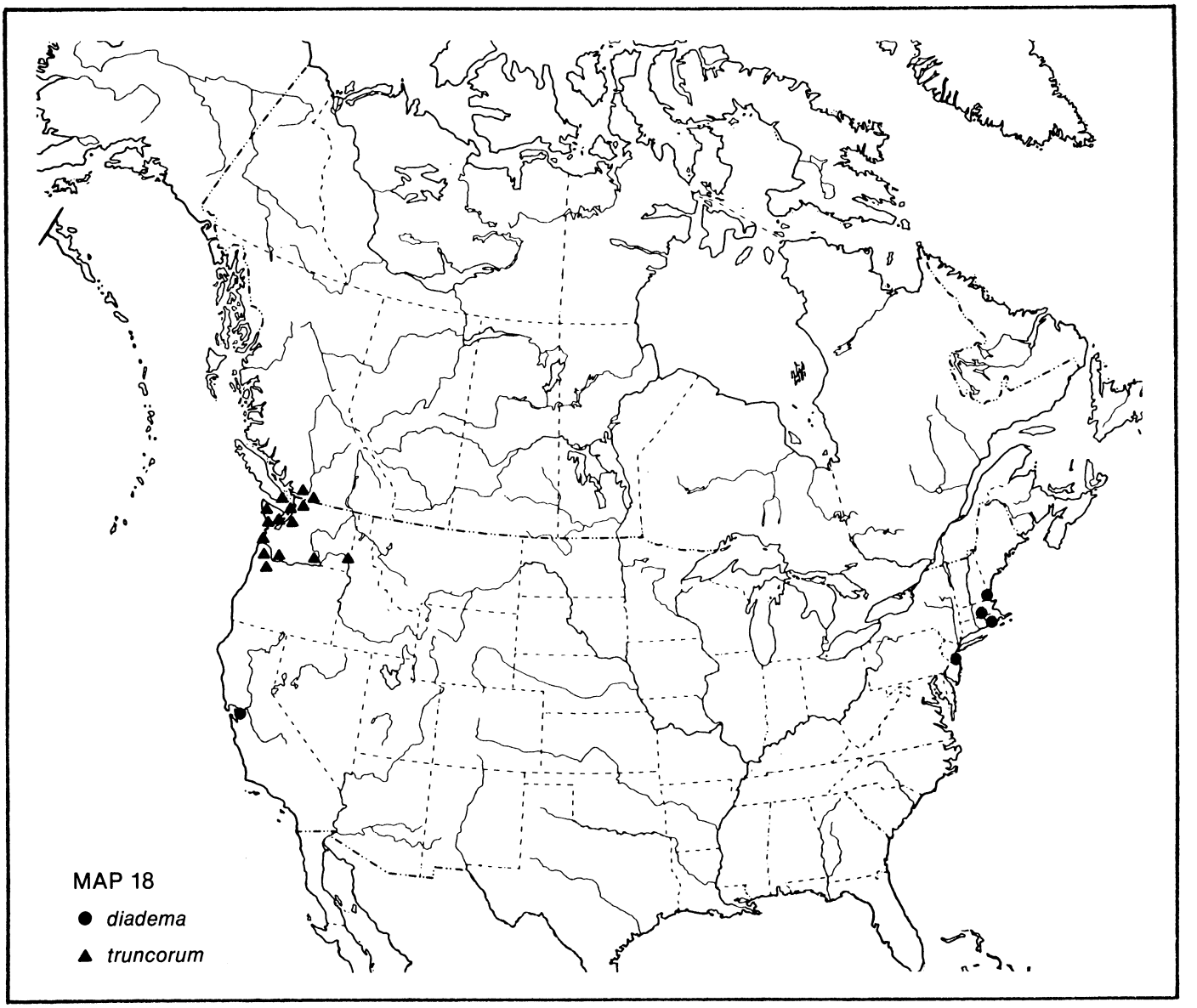

MAP 13
● *vidua*

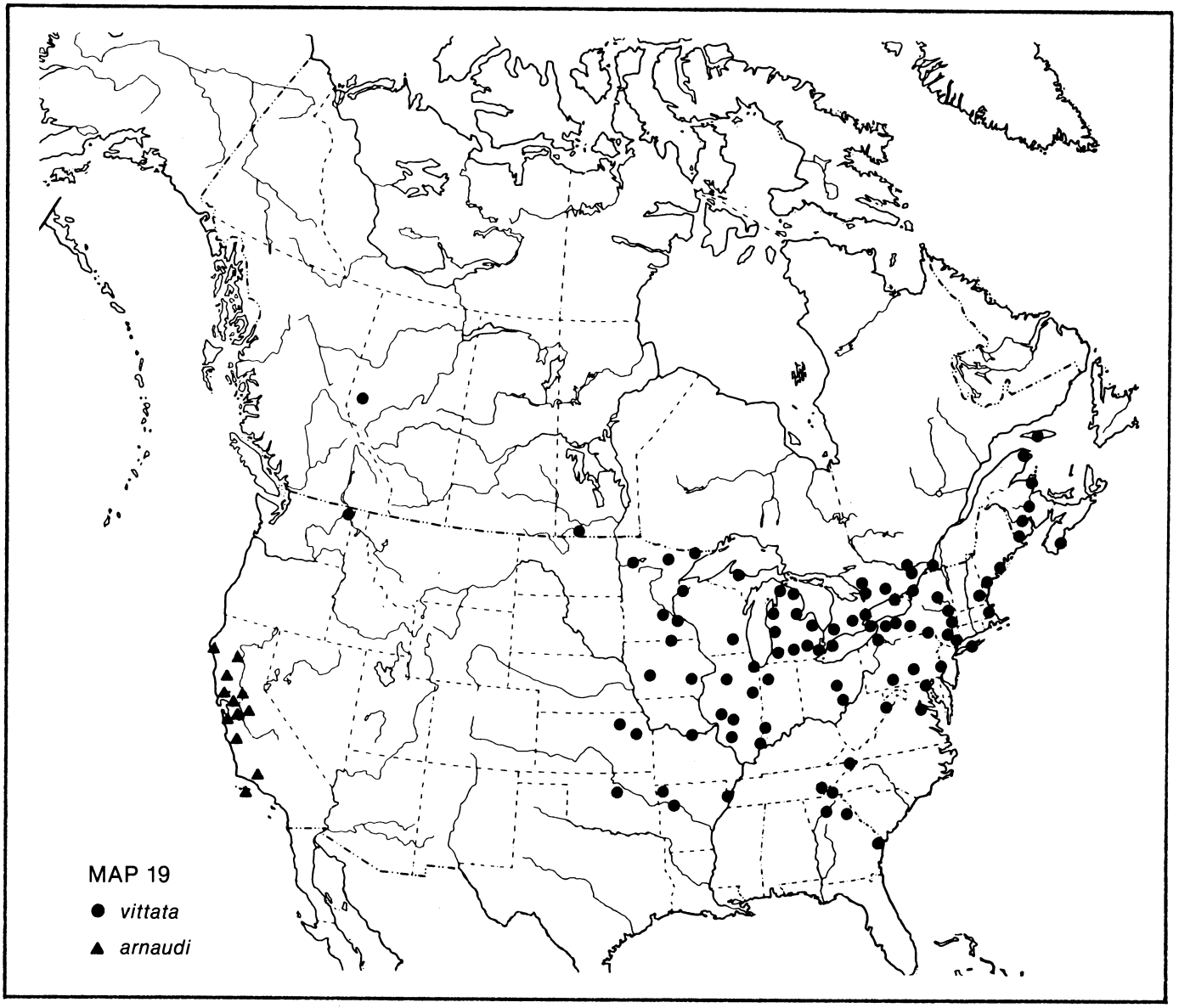

MAP 14
● *apicalis*
○ *apicalis* with yellow scape, pedicel

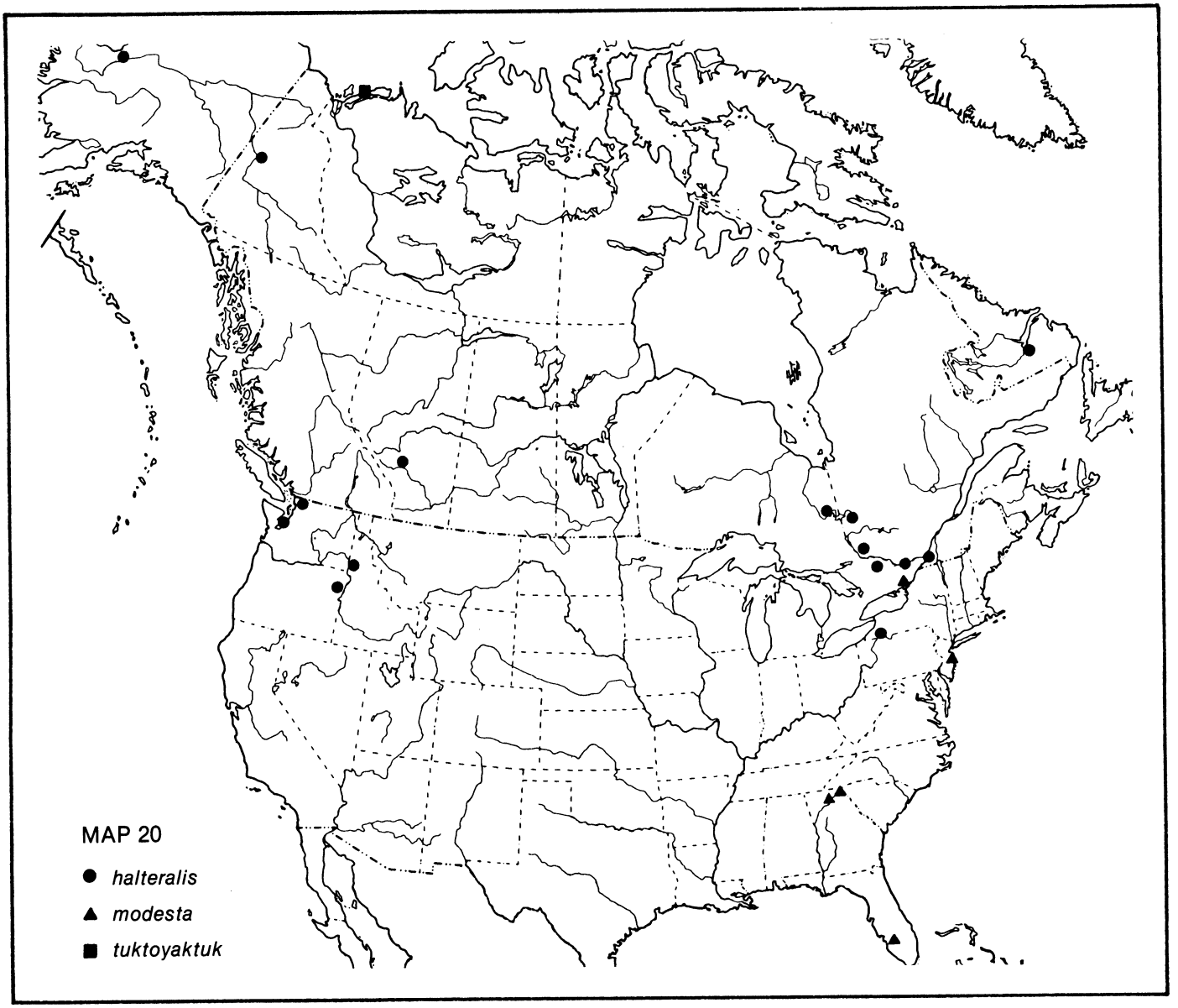

MAP 15
● longinervis
▲ saguaroicola
■ crassivenis
❄ marylandica

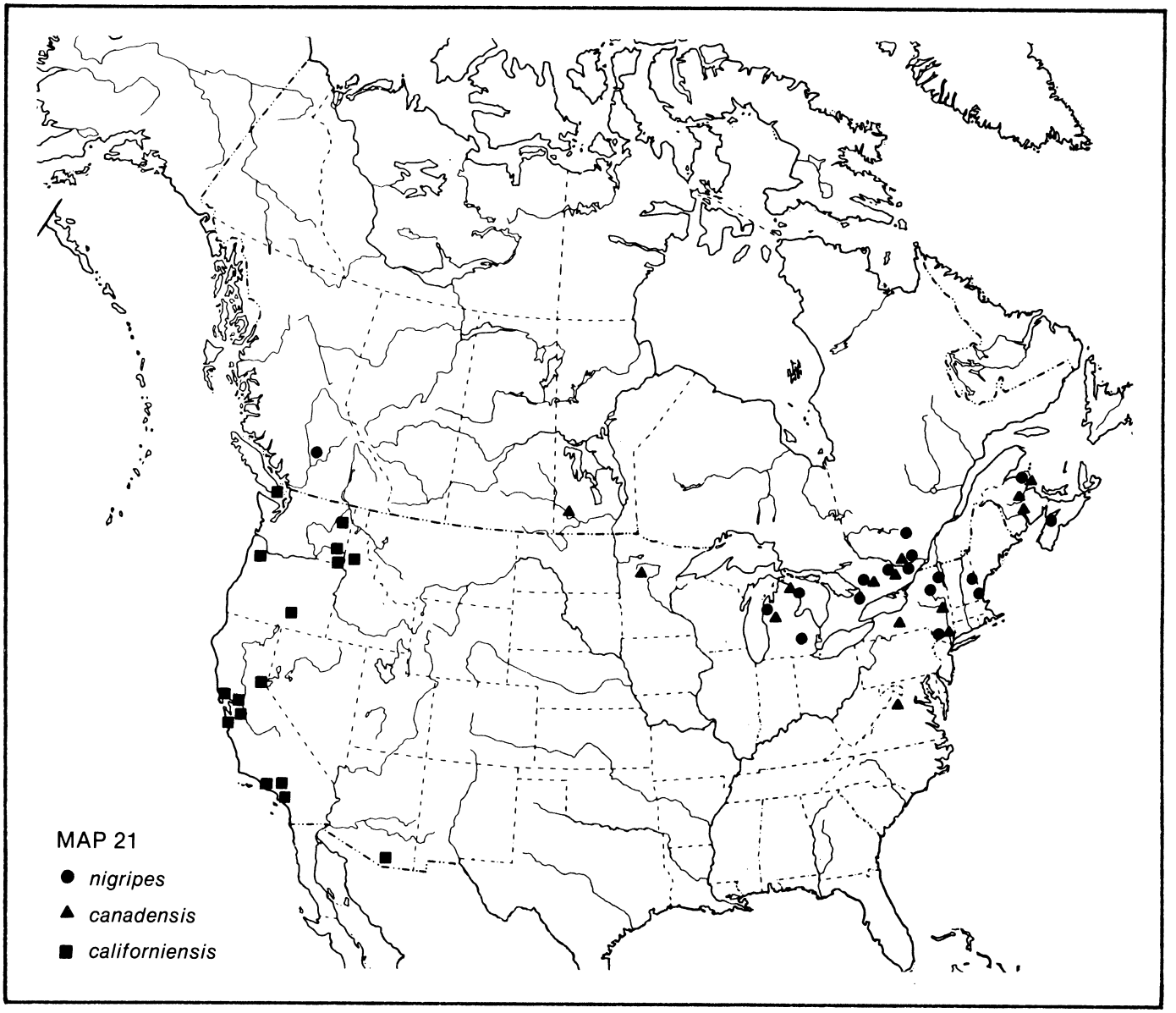

MAP 16
● pseudosibirica
▲ cyanogaster
■ furcata

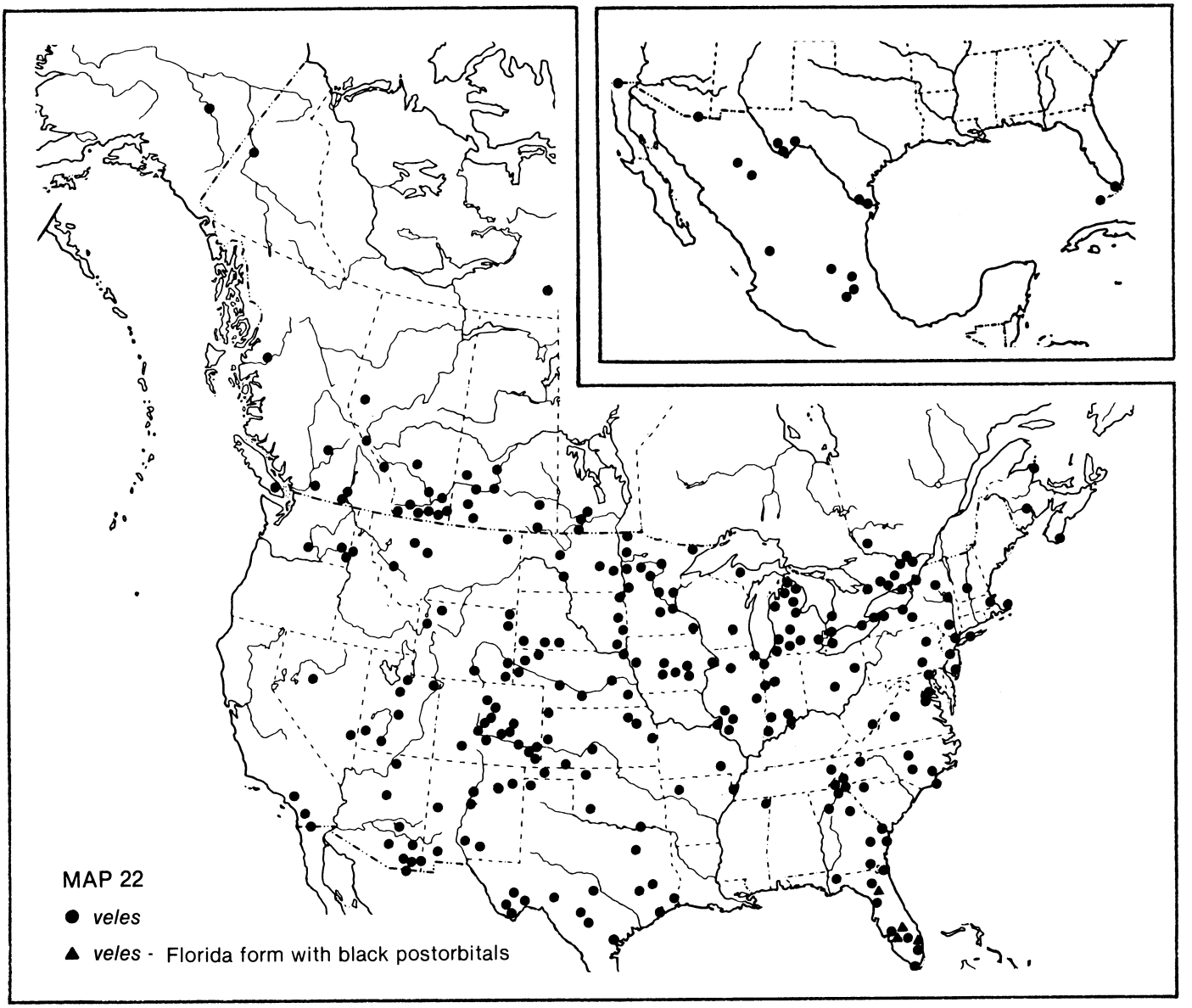

MAP 17
● vockerothi
▲ aberrans
△ aberrans (females only)


MAP 18
● diadema
▲ truncorum


MAP 19
● vittata
▲ arnaudi


MAP 20
halteralis
modesta
tuktoyaktuk


MAP 21
nigripes
canadensis
californiensis


MAP 22
● *veles*
▲ *veles* - Florida form with black postorbitals

Index to Species

This index contains only the principal references to the names of Nearctic *Medetera* and those of the Palearctic species included in the synonymy. Valid names are in roman and synonyms in italic.

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